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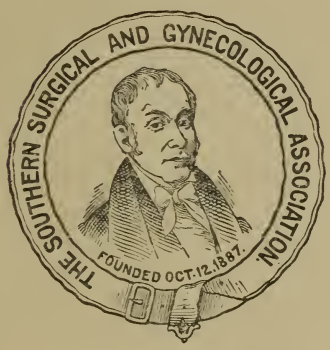

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1890.—Opie, Thomas, M.D. Dean of the College of Physi-

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1890.—Reamy, Thaddeus Asbury, M.D., LL.D. Professor of Clinical Gynecology in the Medical College of Ohio; Obstetrician and Gynecologist to the Cincinnati Hospital; Gynecologist to the Good Samaritan Hospital; Surgeon to the Cincinnati Woman's Hospital; Consulting Gynecologist to Christ's Hospital; Consulting Gynecologist to the Ohio State Women's Hospital; ex-President of the American Gynecological Society; ex-President of the Ohio State Medical Society; ex-President of the Cincinnati Obstetrical Society and Academy of Medicine; Corresponding Member of the Boston Gynecological Society and of the Detroit Academy of Medicine. Cincinnati, Ohio.

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Founder.—Schilling, Nicholas, M.D., Cedar Bayou, Texas.

1896.—Schumpert, T. E., M.D. Surgeon-in-charge Shreveport Charity Hospital. Shreveport, La.

1893.—Senn, Nicholas, M.D., Ph.D., LL.D. Professor of Practice of Surgery and Clinical Surgery, Rush Medical College; Professor of the Practice of Surgery, Chicago Polyclinic; Attending Surgeon, Presbyterian Hospital; Surgeon to St. Joseph's Hospital; ex-President of the American Surgical Association. Chicago, Ill.

Founder.—Shivers, Offa Lunsford, M.D. Councillor of the Alabama Medical Association. Marion, Ala.

Founder.—Sholl, Edward Henry, M.D. Ex-President of the Medical Association of the State of Alabama; Member of the State Board of Censors and of the Committee of Public Health, Alabama. Birmingham, Ala.

1892.—Simons, T. Grange, M.D. Ex-President of the South Carolina Medical Association; Member of the State Board of

Health of South Carolina; formerly President of the Charleston County Medical Society. Charleston, S. C.

1893.—Simons, Manning, M.D. Professor of Clinical Surgery in the Medical College of the State of South Carolina; Surgeon to St. Francis' Infirmary; Surgeon to City Hospital. *Vice-President*, 1895. Charleston, S. C.

1894.—Smith, Reginald K., M.D. United States Navy.

Founder.—Souchon, Edward, M.D. Professor of Anatomy and Clinical Surgery, Medical Department of Tulane University; Member American Surgical Association. New Orleans, La.

Founder.—Stone, Isaac Scott, M.D. Gynecologist to Columbia Hospital; Fellow of the American Association of Obstetricians and Gynecologists; Fellow of the British Gynecological Society; formerly Member of the Medical Examining Board of Virginia. Washington, D. C.

1894.—Talley, D. F., M.D. Lecturer on Surgery, Birmingham Medical College. Birmingham, Ala.

Founder.—Taylor, B. W., M.D. Ex-President of the State Medical Association of South Carolina; ex-President of the Columbia Medical Society. Columbia, S. C.

Founder.—Taylor, Hugh M., M.D. Professor of Practice of Surgery, University College of Medicine; Surgeon to Virginia Hospital; ex-President of the Virginia Board of Medical Examiners. Richmond, Va.

1895.—Thompson, F. D., M.D. Fellow American Association of Obstetricians and Gynecologists. Fort Worth, Texas.

1892.—Thompson, J. E., M.D. Professor of Surgery in the University of Texas. Galveston, Texas.

1891.—Tiffany, Louis McLane, M.D. Professor of Surgery in the University of Maryland; Fellow of the American Surgical Association. *President*, 1895. Baltimore, Md.

1890.—Tompkins, Christopher, M.D. Professor of Obstetrics in the Medical College of Virginia. Richmond, Va.

1891.—Trippe, Richard Jefferson, M.D. Ex-President of the Chattanooga Medical Society. Chattanooga, Tenn.

1893.—Tucker, F. H., M.D. President of the Board of Medical Examiners in Second Judicial District of Texas. San Augustine, Texas.

1889.—Tuholske, Herman, M.D. Professor of Surgery, Missouri Medical College. St. Louis, Mo.

1893.—Vander Veer, Albert, M.D. Professor of Clinical,

Didactic and Abdominal Surgery, Albany Medical College; Fellow of the American Surgical Association; ex-President of the American Association of Obstetricians and Gynecologists. Albany, N. Y.

1891.—WALKER, EDWIN, M.D., Ph.D. Gynecologist, Evansville City Hospital; ex-President of the Indiana State Medical Society; Fellow of the American Association of Obstetricians and Gynecologists. Evansville, Ind.

Founder.—WATHEN, WILLIAM HUDSON, M.D. Professor of Abdominal Surgery, Obstetrics and Gynecology in the Kentucky School of Medicine; ex-Chairman of the Section on Obstetrics and Diseases of Women, American Medical Association; ex-President of the Kentucky State Medical Society; Consulting Gynecologist to the Louisville City Hospital; Fellow of the American Gynecological Society. Louisville, Ky.

1896.—WAY, JOE HOWELL, M.D. Superintendent Health, Haywood County, N. C.; Secretary Haywood County Medical Society. Waynesville, N. C.

1895.—WEIST, JACOB ROWLAND, A.M., M.D. Surgeon to St. Stephen's Hospital; Secretary American Surgical Association. Richmond, Indiana.

1888.—WESTMORELAND, WILLIS F., M.D. Professor of Surgery, Atlanta Medical College. Atlanta, Ga.

1890.—WILSON, HENRY PARKE C., M.D. Ex-President of the Medical and Chirurgical Faculty of Maryland and of the Baltimore Academy of Medicine, and of the Baltimore Gynecological and Obstetrical Society; Surgeon to the Hospital for Women, of Maryland; Consulting Gynecologist to St. Agnes' Hospital; Consulting Surgeon to the Johns Hopkins Hospital; Fellow of the British Medical Association and of the British Gynecological Society; ex-President of the American Gynecological Society. Baltimore, Md.

Founder.—WILSON, J. T., M.D. Ex-President of the North Texas Medical Association. *Vice-President*, 1891. Sherman, Texas.

1891.—WYETH, JOHN ALLAN, M.D. Professor of Surgery, New York Polyclinic; Consulting Surgeon to St. Elizabeth's Hospital; Visiting Surgeon to Mt. Sinai Hospital and Polyclinic Hospital; Honorary Member of the Texas State Medical Association; ex-President of the New York Pathological Society. New York, N. Y.

CONSTITUTION.

ARTICLE I.

The name of this Association shall be The Southern Surgical and Gynecological Association.

ARTICLE II.

The object of this Association is to further the study and practice of surgery and gynecology among the profession of the Southern States.

ARTICLE III.

This Association shall adopt and conform to the Code of Ethics of the American Medical Association.

ARTICLE IV.

Section 1. Any reputable physician, who practises surgery or gynecology, and who is vouched for by two members of the Association, and recommended by the Council, shall be eligible to membership in this body.

Sec. 2. The honorary members shall not exceed ten in number, and shall enjoy all the privileges of other members, excepting to vote or hold office, but shall not be required to pay any fee.

ARTICLE V.

Section 1. The officers of this Association shall be a President, two Vice-Presidents, a Secretary, a Treasurer, and a Council, elected by ballot, without nomination.

Sec. 2. The President and Vice-Presidents shall be elected for one year, and the President shall not be eligible for re-election at any time; the Secretary and Treasurer, each, for five years; and the Council as provided for in the By-laws.

ARTICLE VI.

SECTION 1. It shall be the duty of the President to preside at all meetings of the Association; to give the casting vote; to see that the rules of order and decorum be properly enforced in all deliberations of the Association; to sign the approved proceedings of each meeting, and to approve such orders as may be drawn upon the Treasurer for expenditures ordered by the Association.

SEC. 2. In the absence of the President the first Vice-President shall preside, and in his absence the second Vice-President shall preside.

SEC. 3. In the absence of all three, the Association shall elect one of its members to preside *pro tem.*

SEC. 4. It shall be the duty of the Secretary to keep a true and correct record of the proceedings of the meetings; to preserve all books, papers and articles belonging to the archives of the Association; to attest all orders drawn on the Treasurer for moneys appropriated by the Association by the seal of the Association; to keep the account of the Association with its members; to keep a register of the members, with the dates of their admission and places of residence. He shall collect all moneys due from the members and pay to the Treasurer, taking his receipt for the same. He shall report such unfinished business of previous meetings as may appear on his books requiring action, and attend to such other business as the Association may direct. He shall also supervise and conduct all the correspondence of the Association, and be chairman of the Publishing Committee.

SEC. 5. It shall be the duty of the Treasurer to keep a correct record of all moneys received from the hands of the Secretary, giving his receipt for the same; pay them out by order of the Association as indorsed by the President and attested by the seal in the hands of the Secretary.

SEC. 6. It shall be the duty of the President of the Association to appoint a Committee of Finance, consisting of three members of the Association, whose duty it shall be to examine the books of the Secretary and Treasurer, and report on the same at the next session of the Association.

ARTICLE VII.

Vacancies occurring in the officers of the Association shall be filled by appointment of the President until the next meeting. He shall also have the appointment of all committees not otherwise provided for.

ARTICLE VIII.

This Constitution shall take effect immediately from the time of its adoption, and shall not be amended except by a written resolution, which shall lie over one year, and receive a vote of two-thirds of the members present.

ARTICLE IX.

Any member who for three consecutive years fails to attend the meetings shall be dropped from the roll of membership.

BY-LAWS.

ARTICLE I.

The Southern Surgical and Gynecological Association shall meet annually on the second Tuesday of November at 10 A.M., at such place as may be designated by the preceding meeting.

ARTICLE II.

The members present shall constitute a quorum for business.

ARTICLE III.

The annual dues of each member shall be $10, paid in advance.

ARTICLE IV.

The usual parliamentary rules governing deliberative bodies shall govern the business workings of this Association.

ARTICLE V.

All questions before the Association shall be determined by a majority of the votes present.

ARTICLE VI.

The President shall deliver an annual address at each meeting of the Association.

ARTICLE VII.

The Secretary of the Association shall receive, at each annual Session, a draft from the President, drawn on the Treasurer, for the sum of $100 for services rendered the Association, and to this shall be added the necessary expense incurred in the discharge of his official duties.

ARTICLE VIII.

It shall be the duty of the Secretary, one month prior to the annual meeting, to notify by circular letters the members of the Association, and urge their attendance.

ARTICLE IX.

The authors of all essays shall notify the Secretary, six weeks prior to the meeting, of the titles of their essays, so that they may be incorporated in the circular letter to the members.

ARTICLE X.

COUNCIL.

The Council shall consist of five members; and of those elected at the primary meeting, the first shall serve five years, the second four, the third three, the fourth two, and the fifth one year; so

that subsequently one member of the Council shall be elected annually to serve five years. The President and Secretary shall be *ex-officio* members of the Council.

This Council shall organize by electing a Chairman and Secretary, and shall keep a record of its proceedings.

The duties of this Council shall be—

1. To investigate applications for membership and report to the Association the names of such persons as are deemed worthy.

2. To take cognizance of all questions of an ethical, judicial, or personal nature, and upon these the decision of the Council shall be final; *provided*, that appeal may be taken from such decision of the Council to the Association, under a written protest, which protest shall be sustained by the Association, and the matter shall then be referred to a special committee, with power to take final action.

3. All motions and resolutions before the Association shall be referred to the Council without debate, and it shall report by recommendation at as early an hour as possible.

ARTICLE XI.

The following are the standing committees of the Association to be filled by the President and to report at the next annual meeting subsequent to their appointment, viz.: Committee of Arrangements and Committee of Publication. The Committee of Publication shall consist of three members, one of whom, the Secretary of the Association, shall also be the chairman of the said committee. The Committee of Arrangements shall consist of five members.

ARTICLE XII.

The Committee of Publication shall have full power to omit from the published TRANSACTIONS, in part or in whole, any paper that may be referred to it by the Association, unless specially instructed to the contrary by the Association, which will be determined by vote.

ARTICLE XIII.

Any member failing to pay his dues for more than one year shall be dropped.

ARTICLE XIV.

Every physician making application for membership shall present with his application a paper on some surgical or gynecological subject.

ARTICLE XV.

No paper shall be read before this Association which does not deal strictly with a subject of surgical or gynecological importance.

ARTICLE XVI.

No paper read before the Association shall be published in any medical journal or pamphlet for circulation, as having been read before the Association, without having received the indorsement of the Committee of Publication

ARTICLE XVII.

The reading of papers shall be limited to twenty minutes each, except by permission of the Association.

MINUTES OF THE PROCEEDINGS

AT THE

NINTH ANNUAL MEETING

OF

THE SOUTHERN SURGICAL AND GYNECOLOGICAL ASSOCIATION,

HELD AT THE

NICHOLSON HOUSE,

Nashville, Tenn.,

NOVEMBER 10, 11, AND 12, 1896.

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NINTH ANNUAL MEETING.

The following-named members were present:

ATCHISON, C. R.	Nashville, Tenn.
BALDRIDGE, F. E.	Huntsville, Ala.
BAXTER, GEO. A.	Chattanooga, Tenn.
BOVÉE, J. W.	Washington, D. C.
BRIGGS, CHAS. H.	Nashville, Tenn.
BROKAW, AUGUSTUS V. L.	St. Louis, Mo.
BUIST, J. R.	Nashville, Tenn.
CARTLEDGE, A. M.	Louisville, Ky.
COBB, W. H. H.	Goldsboro, N. C.
COLEY, A. J.	Alexander City, Ala.
DANDRIDGE, N. P.	Cincinnati, O.
DAVIS, J. D. S.	Birmingham, Ala.
DAVIS, W. E. B.	Birmingham, Ala.
DOUGLAS, RICHARD	Nashville, Tenn.
DOUGHTY, W. H.	Augusta, Ga.
EVE, DUNCAN	Nashville, Tenn.
EVE, PAUL F.	Nashville, Tenn.
FORD, DESAUSSURE	Augusta, Ga.
FRY, HENRY D.	Washington, D. C.
GASTON, JAS. McF.	Atlanta, Ga.
GOGGANS, JAS. A.	Alexander City, Ala.
HAGGARD, W. D.	Nashville, Tenn.
HAGGARD, W. D., Jr.	Nashville, Tenn.
HEFLIN, WYATT	Birmingham, Ala.
HUNTER, H. M.	Union Springs, Ala.
JOHNSON, JOSEPH TABER	Washington, D. C.
JOHNSTON, GEO. BEN	Richmond, Va.
KELLY, H. A.	Baltimore, Md.
KIME, R. R.	Atlanta, Ga.
LEWIS, E. S.	New Orleans, La.

McGANNON, M. C.	NASHVILLE, TENN.
McMURTRY, L. S.	LOUISVILLE, KY.
McRAE, F. W.	ATLANTA, GA.
MAURY, R. B.	MEMPHIS, TENN.
MURFREE, J. B.	MURFREESBORO, TENN.
NOBLE, CHAS. P.	PHILADELPHIA, PA.
PARKER, WM. E.	NEW ORLEANS, LA.
RHETT, R. B.	CHARLESTON, S. C.
SAUNDERS, BACON	FORT WORTH, TEXAS.
WILSON, J. T.	SHERMAN, TEXAS.

Letters and messages of regret were received from a number of the members who were unable to attend the meeting.

FIRST DAY—*Tuesday, November* 10, 1896.

Morning Session.—The meeting was called to order by the President, Dr. Ernest S. Lewis, of New Orleans, La., at 9.30 A.M. Divine blessing was invoked by the Rev. J. J. Vance.

Dr. W. D. Haggard, Chairman of the Committee of Arrangements, at the conclusion of the prayer, made the following verbal report:

REPORT OF THE COMMITTEE OF ARRANGEMENTS.

Mr. President and Members of the Southern Surgical and Gynecological Association:

When the Association was invited last year to meet in this city we hoped to have had our Exposition in full blast, but for reasons that were satisfactory to the Directory of the Exposition, it has been put off until next May. This was done, I understand, in order to have arrangements more perfect, and that we might have one of the grandest expositions that has ever taken place on this continent. We feel that we are going to have it. We are making every preparation, and in behalf of the Centennial Exposition I am requested to announce that you are cordially invited to visit the Exposition grounds. I want to say further that your local committee have made arrangements to entertain you at the Centennial grounds to-morrow after the adjournment of the morning session, and at Bell Meade the Association will be given a barbecue. (Applause.)

The following address of welcome was delivered by the Hon. John Bell Keeble.

ADDRESS OF WELCOME.

Mr. Chairman and Members of the Southern Surgical and Gynecological Association: I understand you have assembled in this city for the purpose of advancing your professional interests. We are particularly proud of our medical profession; we are proud of our schools. I do not know whether other people think that our pride is justifiable or not, but I believe the first thing that makes other people proud of anything is to be proud of it one's self. Self-respect is often a prerequisite to the respect of other men, and we believe that we have reason to have self-respect and pride in our medical bodies, not only in their number, but in the character and ability of those men who instruct the young men that we turn out each year to relieve suffering humanity. We have three prominent universities, the University of Nashville, the University of Tennessee, and the Vanderbilt University. As I am an alumnus of the Vanderbilt University, I ought, I suppose, to put my alma mater in the rear on the present occasion. I am a member of the Faculty of the University of Tennessee, and feel at liberty in putting her behind. I do not mean to accord all the honor and prominence to any one of these institutions, for I find different doctors and members of Faculties fall out occasionally about the prominence of their respective institutions (laughter), and it is not right to take sides, for these institutions will unite most heartily in matters of education. We believe we have reason not only to be proud of our educational institutions, but to be proud of our State. So we extend to you a hearty welcome, not only in behalf of the Faculties of those institutions, but in behalf of every citizen and the city itself. Gentlemen, we are particularly delighted to welcome you for several reasons. In the first place, the men who compose your Association devote their time, their talents, their genius to the discovery of truth, to the investigation of some scientific problem, to the solving of some perplexing and vexing question that disturbs the world. (Applause.) I do not think anything is nobler than the men who bend their thoughts in a common purpose trying to find out that which is true. The man who can lay hold of one single

truth to give to his fellow men; the man who can discover one new truth in any line is a benefactor to the race. How much, then, are we benefited when men gather together and bend their thoughts for the purpose of understanding, of unfolding some sealed book, or of presenting to the world some new thought, some noble truth. It is a combination of power, one trust that all humanity can rise up and bless, and that God himself can baptize with his choicest benediction. We welcome you, then, as men who seek for truth. But we go one step further. We welcome you as men who relieve suffering humanity, who seek for truth that is universal in its application. A man may be instructive; he may be able to establish laws, and many men will receive direct benefit from them. A man may search in particular lines of science for the discovery of truths, and you and I may never have recourse to them; but never a man lived, never a man was born in all the world who has not been benefited at one time or another by your discoveries, by your skill. Therefore we hail you that one step further. Then, gentlemen, I go still another step. We welcome you as men who are associated together in striving to find that which alleviates suffering, which prolongs the life of womankind, that which confers upon society a lasting and pronounced benefit that we cannot estimate. You are assembled in that sphere. You relieve the suffering wife, the suffering mother; you illuminate the whole home; you inspire the men to go forth happier, stronger; and of all privileges of medicine, give me that branch which tries to bring peace, happiness, and health to that portion of society that has ever been its strength, that has ever been its inspiration—our mothers, our sisters, our sweethearts, and our wives. (Applause.)

I greet you again as an army of humanitarians, whose time is taken up with the struggle against disease and death. As long as our earth revolves in its course around the sun you will not be permitted to lay down your arms. We hail you, then, as members of one army that will last as long as time, and will only surrender when the last trumpet sounds that brings us to stand still and listen to the word that the world is ended.

Again, in the name of this city; in the name of the faculties of our institutions; in the name of the physicians of our city; in the name of those who love truth, who love woman, who love mankind; in the name of those who love health and happiness;

and in the name of those who love God, we greet you as a body of scientific men who would build up rather than tear down, who would preserve rather than destroy this body which is the temple of God. (Loud applause.)

RESPONSE TO THE ADDRESS OF WELCOME BY PRESIDENT LEWIS.

Gentlemen of the Medical Profession of Nashville: I regret that the agreeable duty of responding to the eloquent, hospitable, and courteous welcome of the gentleman who has just spoken should have devolved on one so little fit to respond as appropriately as he would desire on this occasion. The beautiful city of Nashville has long been noted for its culture and refinement, for its business enterprise and its educational advantages, and it was not necessary for the gentleman to so inform us, and equally noted for the high character and distinction of its physicians, who number in their ranks such eminent leaders as William K. Bowling, Paul F. Eve, and William T. Briggs—men whose names will live in history as the memory of their great and good deeds is enshrined in the hearts of the grateful thousands whom they have relieved. Gentlemen, in behalf of the Southern Surgical and Gynecological Association I return sincere thanks for this cordial and hospitable welcome. (Applause.)

Papers were then read as follows:

1. "Vaginal *versus* Abdominal Section for Pus in the Pelvis," by Dr. W. D. Haggard, Jr., of Nashville, Tenn.

Discussed by Drs. Johnson, Noble, Kelly, McMurtry, Bovée, Maury, W. E. B. Davis, and discussion closed by the essayist.

2. "Cholelithiasis, with Report of Cases," by Dr. A. M. Cartledge, of Louisville, Ky.

The discussion was opened by Dr. Gaston, and continued by Drs. John D. S. Davis, Johnston, W. E. B. Davis, Baxter, McRae, and discussion closed by the author of the paper.

Afternoon Session.—The Association reassembled at 2.30 o'clock, and was called to order by the President.

3. "Mental Complications following Surgical Operations," by Dr. John T. Wilson, of Sherman, Texas.

Discussed by Drs. Lewis, Parker, Rhett, Cartledge, John D. S. Davis, Johnson, and in closing by the essayist.

4. "Splitting of the Capsule for Nephralgia, with Report of Cases," by Dr. Geo. Ben Johnston, of Richmond, Va.

Discussed by Drs. Bovée, John D. S. Davis, and in closing by the essayist.

5. "Uretero-ureteral Anastomosis; a Case," by Dr. J. Wesley Bovée, of Washington, D. C.

Discussed by Drs. Kelly, Noble, and in closing by the essayist.

6. "The Treatment of Pregnancy and Labor Complicated by Fibroid Tumors of the Uterus," by Dr. Henry D. Fry, of Washington, D. C.

Discussed by Drs. Coley, Rhett, Kelly, Haggard, Goggans, Gaston, Baxter, Lewis, and discussion closed by essayist.

On motion, the Association adjourned until 8 P.M.

Evening Session.—A banquet was tendered to the Association by the local medical profession. Dr. Crawford, of Nashville, acted as toastmaster.

SECOND DAY—*Wednesday, November* 11, 1896.

Morning Session.—The Association met at 9.30 o'clock, and was called to order by the President.

7. "Uterine Drainage as a Factor in the Prevention of Pelvic Inflammation," by Dr. R. R. Kime, of Atlanta, Ga.

Discussed by Drs. Bovée, Kelly, Haggard, Noble, Johnson, Goggans, McRae, Fry, and in closing by the essayist.

The following-named gentlemen were recommended for membership by the Council:

Charles P. Noble	Philadelphia, Pa.
J. Monson Hundley	Baltimore, Md.
E. Lomax Gwathmey	Norfolk, Va.
J. Howell Way	Waynesville, N. C.
W. G. Christian	Charlottesville, Va.
William P. Matthews	Richmond, Va.
W. H. Doughty	Augusta, Ga.
William H. Myers	Fort Wayne, Ind.
W. D. Haggard, Jr.	Nashville, Tenn.
C. R. Atchison	Nashville, Tenn.
Paul F. Eve	Nashville, Tenn.
J. R. Buist	Nashville, Tenn.
Charles H. Briggs	Nashville, Tenn.

On motion of Dr. Kelly, the Secretary was instructed to cast the ballot of the Association for the election of these gentlemen, which he did, and they were declared duly elected.

8. "Gunshot-wounds of the Abdomen," by Dr. W. E. Parker, of New Orleans, La.

Discussed by Drs. Gaston, Dandridge, Cartledge, Brokaw, W. E. B. Davis, Rhett, Hunter, John D. S. Davis, McRae, and the discussion closed by the essayist.

At the conclusion of the discussion, Dr. Howard A. Kelly offered the following resolution:

Resolved, That it is the sense of the members of the Southern Surgical and Gynecological Association that in gunshot-wounds penetrating the abdominal cavity, the proper routine procedure is to make an immediate exploratory abdominal incision.

Seconded and unanimously carried.

9. "The Evolution and Perfection of the Aseptic Surgical Technique," by Dr. L. S. McMurtry, of Louisville, Ky.

Discussed by Drs. Kelly, Johnston, Noble, Baxter, Haggard, McRae, Goggans, and discussion closed by Dr. McMurtry.

On motion, the Association adjourned until 2.30 P.M.

Afternoon Session.—The Association reassembled at 2.30 P.M., and was called to order by the President.

The Vice-President, Dr. Joseph Taber Johnson, took the chair, and President Lewis delivered his address.

On motion of Dr. Gaston, a vote of thanks was extended to the President for his interesting and instructive address.

10. "A Memorial Address on Dr. Paul F. Eve," by Dr. Richard Douglas, of Nashville, Tenn.

11. "A New Splint for Fractures of Shaft of Humerus," by Dr. George A. Baxter, of Chattanooga, Tenn.

Discussed by Drs. Gaston, Parker, John D. S. Davis, Brokaw, McRae, and in closing by the essayist.

12. "The Relation of the Tubercular Diathesis to its Local Manifestation," by Dr. James McFadden Gaston, of Atlanta, Ga.

This paper was discussed by Drs. Cartledge, Rhett, McRae, Goggans, and the essayist.

On motion, the Association adjourned until 8.30 P.M.

Evening Session.—The Association reassembled, pursuant to adjournment, and was called to order by the President.

13. "The Rational Treatment of the Diseased Appendix by Operation," by Dr. A. V. L. Brokaw, of St. Louis, Mo.

14. "Report of Cases of Appendicitis," by Dr. James A. Goggans, of Alexander City, Ala.

These two papers were then discussed jointly by Drs. Johnson, Gaston, McRae, Kelly, Noble, Baxter, McGannon, Coley, Cartledge, Johnson, Dandridge, Rhett, Haggard, Ford, W. E. B. Davis, and the discussion closed by the essayists.

On motion, the Association adjourned until 9.30 A.M., Thursday.

THIRD DAY—*Thursday, November* 12, 1896.

Morning Session.—The Association met at 9.30 A.M., and was called to order by the President.

15. "Compound Comminuted Fracture of the Radius and Ulna near the Wrist-joint," by Dr. H. M. Hunter, of Union Springs, Ala.

Discussed by Drs. Dandridge, Gaston, John D. S. Davis, Rhett, Saunders, Ford, Baxter, and the discussion closed by the essayist.

Drs. Johnson, Parker, and Wilson were appointed a committee to audit the accounts of the Secretary and Treasurer. The committee subsequently reported that the accounts and vouchers of these officers had been carefully examined and found correct.

Dr. Haggard presented the following report of the Council:

Your Council beg leave to submit the following report:

1. After canvassing the various places for the next meeting of this Association, and carefully considering the advantages of each, we have decided to recommend the city of St. Louis as the place for the next meeting.

2. After discussing the respective claims of the many eligible Fellows for the Presidential Chair, we take pleasure in recommending Dr. George Ben Johnston, of Richmond, Va.; and present the names of Dr. Floyd W. McRae, of Atlanta, Ga., and Dr. W. E. Parker, of New Orleans, La., for Vice-Presidents.

We also recommend Dr. E. S. Lewis, of New Orleans, as a member of the Council, to supply the place of Dr. Hunter McGuire, whose term has expired.

We recommend for membership the names of Dr. Wyatt

Heflin, of Birmingham, Ala., and Dr. T. E. Schumpert, of Shreveport, La.

On motion of Dr. John D. S. Davis, the report of the Council was adopted.

Dr. Cartledge was appointed a committee to escort the President-elect to the chair.

Dr. Johnston on ascending the platform was very warmly received. He said:

This is a very unexpected but most agreeable surprise. I feel utterly unworthy of the honor that you have conferred upon me. I feel that the Association has made a mistake in choosing such an unworthy member to preside over it, yet I wish you to know that I could receive from my professional brethren nowhere an honor that I esteem so highly as this. I look upon this Association as one of the most useful in the country, one which is doing a work the excellence of which cannot be overestimated, and to be a part of this admirable enterprise is in itself a distinguished honor; but to preside over a body which is doing work such as is accomplished by this Association, which is not only making its mark in its own country but abroad, is indeed a very acceptable distinction. I thank you very sincerely for the favor which you have extended me; nevertheless, I wish to protest that I do not think your choice has been a wise one. (Applause.)

16. "Report of a Case of Transperitoneal Ligature of the External Iliac Artery for Inguinal Aneurism, with Removal of the Aneurismal Sac," by Dr. N. P. Dandridge, Cincinnati, O.

17. "Ligation of Common Iliac Artery for Aneurism of External Iliac," by Dr. W. E. B. Davis, of Birmingham, Ala.

The papers were discussed by Drs. Gaston, Parker, John D. S. Davis, Saunders, Cartledge, Brokaw, Ford, and in closing by Dr. Dandridge.

The following papers were read by title:

"Gall-bladder Surgery," by Dr. A. Vander Veer, of Albany, N. Y.

"Contributions to the Pathology of Adherent Placenta," by Dr. Bedford Brown, of Alexandria, Va.

"Maternal Impressions and their Influence upon the Fœtus in Utero, Illustrated by Photographs," by Dr. C. H. Mastin, of Mobile, Ala.

"The Dry Method in Intrauterine Surgery," by Dr. Edwin Walker, of Evansville, Ind.

"Hypertrophic Elongation of the Cervix, with Complete Eversion of Vagina from Fibroid Tumor of the Cervix; Restoration by Operation," by Dr. George H. Noble, of Atlanta, Ga.

"Peculiarities of the Surgical Diseases and Injuries of the Neck," by Dr. Edmond Souchon, of New Orleans, La.

"Hypodermoclysis in Severe Railway Injuries Requiring Multiple Amputation," by Dr. James Evans, of Florence, S. C.

"Tracheotomy *versus* Intubation," by Dr. Chalmers Deaderick, of Knoxville, Tenn.

"Adynamic Obstruction of the Bowels," by Dr. William H. Myers, Fort Wayne, Ind.

On motion of Dr. McRae, a vote of thanks was tendered to the retiring President for the able manner in which he had presided over the deliberations, and also to the Chairman of the Committee of Arrangements for the manner in which the Association had been entertained during its visit to Nashville.

On motion, the Association adjourned to meet in St. Louis, Mo., on the second Tuesday in November, 1897.

W. E. B. Davis, M.D.,
Secretary.

THE PRESIDENT'S ADDRESS.

By E. S. Lewis, M.D.,
New Orleans.

Fellows of the Southern Surgical and Gynecological Association: Whilst deeply appreciating and grateful for the honor of presiding over so distinguished a body, I nevertheless feel that the conferring of this distinction imposes also the obligation of confirming the wisdom of your choice in the future, as your preferment has no foundation in work accomplished for the general good of the profession.

Looking backward, the progress of surgery in the past twenty years is one of the marvels of the age. Anæsthetics and the outcome of antiseptics have stimulated the phenomenal development of this branch of medical science, which now takes precedence in its importance and its potentiality for good.

The brilliant achievements of the masters of the art who have passed away, and of the galaxy of shining lights who have followed after, has created an era in the medical history of this century for all future time. How can we wonder that the "magnificent records obtained by experts have proved alluring temptations to the inexperienced and ambitious" and led to abuses which have left a blot on the fair page of abdominal surgery. As a representative body of the surgeons and gynecologists of the South it should condemn the reckless and thoughtless plunging in this delicate and difficult work without knowledge, fitness, or preparation. The statistics of the skilled who have learned to minimize risk and cope

with difficulties should not serve as an argument with the inexperienced to secure subjects. The responsibility of human life should not be ignored in the craving and struggle for notoriety or fame. The harmonious, sympathetic unity of the complex human organism does not suffer disruption and altered relations without a protest, and discordant notes should not be sounded through ignorance or incapacity.

The enthusiasm akin to frenzy evoked by the grand conceptions of the fathers of modern surgery and the possibilities open to greater achievements crowned this field with an attraction which engaged and fascinated the medical profession and hastened the evolution of those procedures which give to surgery its pre-eminence among the allied branches of medicine. It is an auspicious omen of the dawn of a brighter day that a conservative spirit is now awakened, and that sober thought and judgment, enforced by the light of experience, are paving the way to the formulation of rules, the simplification of methods, and the establishment of order amidst the confusion and doubt which surround us. As recently stated, "the everyday insights gained by modern methods of formerly unknown pathological conditions have solved many intricate problems and opened up possibilities of treatment of which we were ignorant." With a more profound appreciation of the subtle factors of surgical diseases and a deeper knowledge of their pathology we may in time attain the perfection of surgical science and effect cures in cases now relegated to the knife, and which stand in evidence of the surgeon's impotency or incompetency.

In the delirium following the brilliant achievements of Tait, which dazzled the mind and misled the judgment, the wonderful resources of nature were ignored or forgotten, and radical ideas prevailed, prompting measures not always to the best advantage of the patient. A conservative reaction has, however, set in, and is fast awakening to the true mission of surgery—to save, not to destroy. That abuses have arisen on the heels of the auspicious and successful inauguration of this work, all must concede, and the history of pelvic sur-

gery is not without a stigma to dim its lustre and tarnish the brightness of its pages.

The errors of the past were the offspring of ignorance and of the misconception of cause and effect, and were corrected as knowledge increased and experience enlarged. No longer do we hear of castration for the cure of hysteria or other neuroses unless justified by disease of those organs. The leaders in gynecology, imbued with a rational and praiseworthy conservatism, have directed their efforts to this end, and in various operations on the ovaries and tubes a regard for their function is observed. It is strongly in evidence as regards suppurative inflammatory affections of the pelvis, and in the exhaustive essays of Bouilly, Sänger, and Kelly at the International Congress this feature was clearly apparent. The dogmatism which prescribed but one line of conduct has yielded to greater knowledge and experience, and in the classification of these writers stress is laid on the importance of conservative treatment and indications furnished for vaginal puncture in preference to more radical means. Whilst so much has been already accomplished, this field is far from exhausted, and we have still to wait the solution and settlement of questions yet in dispute. The genius whose meteor-like transit across the medical horizon illumined our path prepared the way for a more thorough appreciation of its pathology and a more liberal interpretation of its treatment. In view of the engrossing interest of the profession upon the subject of pelvic suppurations, and of the variance of gynecologists in the adoption of surgical procedures for its relief, I have been tempted to enter into an analysis of these measures, with no intention of ventilating personal views or of advancing anything which has not already been maturely considered and discussed. With regard to the relative merit of the abdominal and vaginal operations for the removal of the ovaries and tubes, or of the uterus with the appendages, divergent opinions are entertained and heated discussions have arisen. For the vaginal method it is claimed less shock is produced, better drainage is obtained, the abdominal walls

are not weakened, and the extirpation of the uterus removes a menacing source of infection and of physical and nervous disturbance. For the abdominal operation rapidity of execution is contended, with increased security to adjacent organs, and facility of repair when injured, as the structures are always in view. The removal of the uterus is also condemned as complicating and unwarrantable unless justified by the state of the organ. In the modified vaginal method as practised by Doyen and others the uterus is not necessarily sacrificed, nor a sound ovary and tube. It is in touch with the conservative movement of the day, and is in marked contrast with the ultra-radical operation of Péan.

Its superiority over the abdominal, he states, is that it affords better drainage for multi-pus-collections encountered and ruptured, and superior advantages for disinfection, with greater immunity from peritoneal infection. As a tentative or exploratory measure, when, from adhesions or large ruptured pus-sacs or other complications, the operator is forced to desist, a safer outlet is furnished for discharges, with less shock and less risk to the patient and a possible chance for recovery without mutilation. It also permits of the removal of the appendages of one side only when the disease is unilateral. The more frequent resort to puncture and drainage, which has effected many cures and is a resurrection of the only measure once practised when the pathology was ignored, is a confession of its value as was known in the past, though since almost forgotten, and attests the reaction in treatment and the conservative spirit awakened. Whether the vaginal operation will ever take root in America, a younger generation must answer. That it will ever supersede the conception which McDowell made possible and the genius of Tait elaborated, may safely be answered in the negative. Should we, however, utterly discard a measure so strongly indorsed by recognized leaders on the continent and pronounce judgment without consideration or trial? Its advocates are loud in its praise, and assert its superiority in the graver cases as far safer and less difficult of performance. Though not con-

vinced by the enthusiastic eulogium of its advocates, is it not reasonable to conclude that with enlarged experience and greater familiarity with this method we may find its application in well-defined indications, and thus avoid the abdominal incision, with the objectionable features attendant? That it meets with disfavor among the leaders in this country is easily reconciled with custom and habit and the marvellous results of laparotomy. Their names are so intimately blended with the glorious achievements by this method in the unequalled record of their skill that an unprejudiced view is most difficult and even not to be sought. To a younger generation, therefore, unbiased by the preference of their seniors, must be relegated the judgment of its merit and the assignment of its *rôle* of usefulness among the other procedures employed. Until this moment is reached the usual concomitants of disagreement may be expected to disturb the serenity of the gynecological atmosphere and to enliven and add spice to discussions and to medical literature.

Closely allied to this subject in the interest aroused among gynecologists, as shown in the fertility of the literature and its prominence in discussions, is the surgical treatment of fibroids, the evolution of which, despite the opposition attending the high rate of mortality of the early efforts, by the crude methods employed, is phenomenal and stamps it among the most remarkable achievements in surgery. The intra-abdominal treatment of the stump was the first step in the perfection of those measures which reduced a most formidable operation to the level of ovariotomy as life-saving and health-restoring. The authors of this boon to suffering woman deserve to be enrolled among the benefactors of mankind and to live in memory for the good they have effected. Whilst so much has been done for the minimizing of risk and the reduction of mortality, very divergent views are entertained regarding the methods employed.

In the retention of a stump or button of the cervix, distortion of the bladder and vagina is less apt to occur, it is claimed, and more efficient support to the peritoneal cavity

is obtained. By total hysterectomy, with equal confidence, we are assured of its removing all danger of hemorrhage, of possible infection through the cervix, and of the better drainage afforded, without disturbing the bladder or vagina; then again we are met with a varied technique for the accomplishment of the same purpose, and we find advocates of the vaginal route in tumors of moderate size, of the vagino-abdominal with ligatures or clamps, or of the abdominal, as the operation of choice, and each equally firm in conviction.

Perhaps in the enucleation method as practised by Doyen the perfection of hysterectomy for fibroids has been attained, if confirmed by the experience of others. His published report of thirty-four cases with thirty-four recoveries is a flattering testimonial of its merit and establishes its claim to the favorable notice of the profession. As no description of this method has appeared as yet to my knowledge in the medical literature of this country, I may be pardoned for outlining his procedure. The abdomen is opened with the patient in the Trendelenburg position. The tumor is eventrated and lifted over the pubis. The Douglas pouch is opened upon a guide pushing it up through the vagina, and the incision enlarged to the sides of the cervix. The posterior lip is then raised and lateral attachments of cervix short of vessels divided. The anterior lip now seized and lifted up, the vaginal fornix in front is opened, and the uterus peels from the bladder without danger of injuring the ureters. The index-finger is then introduced in the abdomen behind the pubis, and the lower border of the broad ligaments seized between it and the thumb, and the utero-ovarian arch isolated. The broad ligament is now divided from cervix to fundus, closely shaving the uterine border. The uterus, rapidly drawn to the right side, partially unrolls from its serous envelope, and the left ligament is similarly divided, blunt-pointed scissors being used during the operation. The flaps then exposed are inspected, the vessels ligated, and the ovaries and tubes excised. The bleeding is trifling, he states, and easily controlled. The peritoneo-vaginal section behind is sutured with

catgut, which represses all oozing. The ligaments are then drawn in the vagina and a double ligature carried around them, which almost completely closes the cavity. The stumps and ligatures are in the vagina, and can be made aseptic. He claims for his method simplicity, rapidity of execution, and greater safety, as in 147 operations for very large fibroids the mortality was but 4.7 per cent. Furthermore, he states that it is suitable to every case, however complicated and whatever its nature, and, as it can be performed more quickly than by any other method, is attended with correspondingly less risk.

An unprejudiced analysis of the various hysterectomy operations for fibroids and a dispassionate consideration of their relation to individual skill, to rapidity of execution, to hæmostasis, and to advantages and risk to patient, is well worthy of discussion, though handicapped by their comparative newness and by deductions arising less from conviction than from self-deception and enthusiasm. Then, again, individuality and inherent or acquired aptitude, which are variable qualities, confront us at the threshold of this inquiry, and might insensibly lead us to discuss men and not measures, as to disconnect them is difficult, so close is the union. The value of a surgical procedure is measured by its effects and results, and if this can be best obtained in one way it would be superfluous and even undesirable to attempt any other. All considerations should be subordinated to the best interests of the patient.

Unlike ovarian tumors, the character and homogeneity of which require but one operative procedure, uterine fibroids, in their complex organization, extensive vascular connection, and eccentricity of development, are not as readily disposed of by a classically defined technique which will include the exigencies of every case. Custom and imitation should also be given due weight, and as accidents frequently determine the course of events, so do surgical contingencies often arise to defeat calculations, to lead to new measures, or direct the choice of well-known procedures.

Conditions do occur to favor the extra-peritoneal treatment of the stump as the means of safety, and if this be granted, is it not logical to conclude that a particular method may be especially chosen to accomplish the purpose, at a minimum risk and with maximum benefit? The fertility of essays on the best means of closing the abdominal incision reflects the defects of all methods and their failure to perfectly restore the integrity of the walls. The frequency of hernia, of unsightly scars, and the care to be observed, speak eloquently in favor of the vaginal route, when practicable, and safe in tumors of moderate size. This channel could more often be utilized in suitable cases and to better advantage. So it may be reasoned of other approved measures which have their advocates and find their application in complications encountered and concatenation of circumstances relative to patient and operator which influence and direct his judgment, test his individuality and the fertility of his resources.

In thus giving prominence to these procedures it has been my object to engage your attention to a closer and perhaps more impartial study of their value, with a view to the classification of indications which will facilitate and influence the choice of the measure.

DR. PAUL F. EVE AND HIS WORK.

By Richard Douglas, M.D.,
Nashville, Tenn.

A retrospect of the lives of great men inspires us with the spirit of emulation and indicates to the ambitious mind the paths to fame. It is the wholesome and beautiful custom of this Association in its annual session to do reverence to the memory of some distinguished member of our profession from the South-land. In the galaxy of greatness there is no brighter star to meet our admiring gaze than that of the lamented Paul F. Eve, and it is with peculiar pleasure and pride that I attempt in an humble way to discharge the duty assigned me.

Prof. Paul F. Eve had three distinguishing characteristics —energy, consistency of purpose, and extreme modesty, and upon them he built for himself an everlasting reputation and secured an imperishable place in the temple of fame. In our conception of great men we may well ask the question, Does greatness consist alone in originating or introducing to the world something new, or is that man truly great who, by application of the knowledge gleaned from others, does most good for humanity? The subject of our memoir does not appear in history as the deviser of some ingenious operation or as the discoverer of any particular new fact, nor did he seek to transmit his name to posterity by attaching it to various mechanical devices, the so-called new instruments especially and exclusively designed for one particular purpose and absolutely useless for all others; yet he was a man equal to emergencies, ready to apply the vast store of knowledge

which he had garnered after years of laborious work in the field of science. Ever ready in resources, he attached but little consequence to the thousand and one things that he did which were practically creations of his own mind, and which the specialist of to-day would flaunt before the public as great and ingenious ideas.

When a post-graduate student in Paris, influenced by his surroundings and true to our American principle of liberty and self-government, his sympathies were elicited for Poland in her last hopeless struggle for freedom from the Russian yoke, and he enlisted as a volunteer surgeon in her service in the war of 1831. He thus acquired, while yet young in his profession, a vast experience in military surgery, and for his services he received the distinguished honor of the Golden Cross.

The war being at an end, his restless energy hurried him back to America and to his Southern home, where his former teachers were proud to welcome him and yield to him the highest place in their faculty, that of professor of surgery. From this date, 1832, it may be said that his professional life began, and now for a period of forty-five years we find him engaged in active work; we see him as the first surgeon of the South; we read of him as a distinguished professor, at various times in his career, of four medical institutions, acquitting himself with such unusual dignity and excellence as a teacher that he was called, year after year, to the larger cities to accept professional honors. Twice he was called to a professorship in the University of New York, the last time to succeed Valentine Mott; but that was just at the beginning of the war of the Rebellion, and his sympathies with the South would not permit him to separate his destiny from the people he loved. Nashville was the home of his choice, and here he distinguished himself for twenty years as the ablest instructor in the science and art of surgery in the South or West. One of his contemporaries—that great medical philosopher, William K. Bowling—in writing of him as a teacher, said, "Of all men I have heard lecture, in force

and presence he was the grandest." This from Bowling, who was the familiar contemporary of the immortal Gross, the sturdy Pancoast, the precise Wood, the brilliant Mott, and the great Dudley, is truly a compliment to the hero of our sketch.

It is not alone as surgeon and teacher that his reputation rests. As a contributor to current medical literature he was a conspicuous authority. Appreciating the full weight and importance of accurately recording interesting cases occurring in his own practice and that of his professional brethren, one of his most substantial productions is his collection of unique surgical cases, which constitutes an octavo volume of some 600 pages. A careful perusal of these cases impresses the reader with the accurate observation, systematic study, and attention to details given by Paul F. Eve to all surgical work.

In military surgery he was without a peer. His experience in Poland had engrafted a taste for the work, which, unfortunately in later years, as one of the chief surgeons of the Confederacy, he had more than ample opportunity to gratify. As the result of his observation and work during the war of secession he recorded many valuable facts which the surgeons of to-day would do well to ponder. He compiled statistics upon the operation of amputation at the hip, excision of the hip-, knee-, and shoulder-joints, and from a study of these cases drew rational conclusions and established principles in practice which have been modified only by the advance of modern surgery.

As a lithotomist Dr. Eve was pre-eminent, especially when we consider that his work was done in rivalry with such surgeons as Dupuytren, Fergusson, Alerton, Thompson, Dudley, Walter; and one more whose name seems lost to history, but whom Dr. Eve was pleased to honor, was Dr. Mettaur, of Prince Edward Court House, Va., who had in 1853 performed seventy-nine operations for vesical calculus, with only four deaths, a remarkable record, considering the period and want of facilities. Dr. Eve was accorded full credit for *his* work done in this line of surgery. In his many trips abroad

the French and English surgeons delighted to welcome him, and spoke of him as "the distinguished American lithotomist." Dr. Gouley, in his work upon *Genito-Urinary Surgery*, published in 1873, pronounces him the most successful American lithotomist. While his preference was for the bilateral method, yet he was not wedded to it, and appreciated the many advantages of the suprapubic operation, and often practised it, not, however, with the same success that he achieved by the perineal section.

In all of Prof. Eve's work he appreciated the value of concise and complete reports, and his statistics upon operations, especially those for stone, are replete with information.

Thoroughness characterized every undertaking of his life. He entered with his whole soul and vigor into the laborious work of his profession, yet he found ample time to give study and thought to collateral branches. Few men were better informed upon the questions of the day, especially those concerning the people of the South, and he looked at everything from the broad standpoint of a refined, educated humanitarian. While exceedingly modest in his personal bearing, he deemed it a part of his duty to himself and to science to publish to the world his observations, experience, and results. Consequently we find him a regular contributor to medical literature. He was not a fluent, nor to some was he a pleasing writer, yet the opinion of invincible probity grows into every reader's mind. Free from self-praise, his evident desire was to tell the whole truth, even though it should reflect upon his skill. Dr. Frank Hamilton, a lifelong and intimate friend of Paul F. Eve, said that Eve was great enough to always tell the truth.

Such a man in any day is sure to attract attention, and the profession of America grew to look upon him as an authority, a safe, worthy leader, and in expression of their regard and admiration for his character and high professional attainments he was unanimously chosen President of the American Medical Association in 1857. In many respects Paul F. Eve resembled the elder Gross. In figure, dignity

of bearing, and grace of manner they were much alike; their zeal, energy, and ambition conducted them along the same paths, and both reaped the richest reward. In their greatness they were generous, free from petty jealousies; neither would stoop to detract from a rival or withhold from an enemy the just praise and credit of his merit. The autobiography of Gross is in reality more a tribute to his colleagues and contemporaries than a record of his own deeds. Prof. Eve was at times in his life a victim of hatred, envy, and malice. More than once he changed his location that his life might be more contented and happy; not that he shrank from his enemies, but he loved peace and professional harmony. His only real rival in his early days was the great Dudley, Professor of Surgery in the Transylvania University at Lexington, Ky.; but if I mistake not, Prof. Dudley lives in history more through the writings of Prof. Eve than by his own recorded work. It was from this great master that Eve and Briggs, our two greatest Southern surgeons, learned much of the art and practice of surgery. One of the great principles of the eminent teacher was impressed upon the life of both Eve and Briggs, and that was the thorough preparation of patients before submitting them to operation. In speaking of it Prof. Eve says, "It is upon this rests the enviable fame of Benjamin Winslow Dudley." Would it not be well for modern surgeons to give a little more attention to the preparation of patients and rely less upon their remarkable skill, aided by the new-found ascepticism?

To but few men is it given to realize so much of the happiness and completeness of life as came to Prof. Eve. When he felt life's toga hanging loose about him, it was with consummate pride that he saw rising up from his own loins two worthy sons, votaries of his chosen profession, manifesting every characteristic that was destined to make for them a name in their profession; and as he laid aside the burdens of life they were taken up by his sons, Duncan and Paul F., Jr., and nobly borne, yea, even in a manner worthy of their

distinguished sire. And so, when the great and good life of Paul F. Eve came to an end, suddenly but peacefully, on November 3, 1877, he had reached more than his threescore years and ten, and, dying, left behind him a name that was destined to live on in surgery, I believe, through *many* generations.

VAGINAL *VERSUS* ABDOMINAL SECTION FOR PUS IN THE PELVIS.

By William D. Haggard, Jr., M.D.,
Nashville, Tenn.

The treatment of pus in the pelvis has passed through several transitional periods. The old unsatisfactory vaginal puncture gave place to the abdominal era, inaugurated by Tait, and practised by his followers. The removal of pyosalpinx through the abdomen was the innovation, which, under the ceaseless scrutiny of the statistician, made the field of abdominal surgery the "Cloth of Gold" of surgical battlegrounds. Then total castration through the vagina for double-pus disease by the French school, and through the abdomen by the American school, engrossed the energies of gynecological operators. These methods have reluctantly given place to modern vaginal section. I say modern advisedly, because it has an essential distinction from the old blind vaginal puncture, with the incomplete evacuation of, perhaps, one compartment of a multiple abscess, when it is contrasted with the free vaginal incision, careful exploration, and thorough evacuation of all pus pockets.

In its present application vaginal section constitutes the most recent acquisition to pelvic surgery, and it bids fair to revolutionize the results in pus disease. It should also be a subject of congratulation that it is a distinctly American procedure. The assertion that the vaginal method is practised by men who are not expert as abdominal operators is incorrect. On the contrary, its employment in the pelvic inflammatory conditions has been evolved by men trained and

thoroughly competent in the other operation. Peculiarly enough, the men who deprecate vaginal section as a blind procedure are the very men who ignore the advantages of the Trendelenburg position in abdominal work. Surely the fingers skilled in the enucleation of pus-tubes through a small incision, unaided by the eye, can work equally well in similar manœuvres *per vaginam.*

We should never forget, however, that the pathologic interpretation of pelvic inflammatory processes, now remedied in part by vaginal section, has reached its present wonderful perfection by those fearless and intrepid abdominal surgeons who rescued the pathology of pelvic inflammation from the myths of antiquity.

In the present inquiry, our motive should be, not to champion the one or the other method to the exclusion of the other, but rather to accentuate the relative worth of the would-be rival methods, and to determine, if possible, the positive indications and comparative merits of each. Unquestionably, the abdominal route affords facilities for visual inspection wholly wanting in the lower approach. The entire field of operation is kept under surveillance, and the attack on certain portions of the morbid masses can be made with entire confidence as to the safety of visceral integrity. Not so with the pus accumulations. If they are multiple, rupture and peritoneal soiling is inevitable, and that very circumstance is the supreme disadvantage of abdominal incision. While we have often seen the pelvis deluged with pus, and no untoward symptoms supervene, we have also seen patients rapidly perish within twelve hours from fulminant sepsis, the result of peritoneal contamination. Without doubt a large proportion of old pelvic abscesses contain so-called spent pus that can be spilled in the peritoneal cavity with impunity. On the other hand, there is that distressingly large class of cases that with singular and classical unanimity succumb on the critical third day to overwhelming sepsis.

There is no certain way of distinguishing these cases clinically, and hence all should be regarded as virulent.

This is a constant and irremediable menace. I have reported at another time[1] a series of collected pus cases performed in the last year in five metropolitan hospitals in New York and Baltimore with a mortality of 18.5 per cent. What must it be in the "unheard from precincts" and in the hands of the great unwashed? This is no reflection on the reported results of many excellent surgeons who do laparotomy with mortalities of 2 and 3 per cent. I insist that this mortality does not include consecutive sections for pus, nor has it ever been done.

Abdominal surgeons have developed and perfected a most exquisite aseptic technique in detail and *ensemble*. They penetrate the abdominal wall in less than a minute with lightning dispatch. They enucleate with dexterity and assured safety to bowel and bladder. Manipulation is reduced to a minimum. Irrigation is deprived of irritation by physiological salt solution. The technique of glass drainage was perfected to such a degree that we were loath to exchange it for the easier and more efficacious vaginal drainage. Methods for homologous approximation of the abdominal wound have been devised that cause it to heal with beauty and surety, and with an inconsiderable number of subsequent herniæ. They accomplish all this with brilliant and sovereign celerity, and yet abdominal section as a routine practice for pus in the pelvis must inevitably fall into desuetude. Of course, there remain many conditions where the abdominal route offers the best means of approach, notably tubercular inflammation of the ovaries and tubes. The removal of a small unilateral pus-tube, out of the true pelvis, or attached to the anterior parietes, is much easier extirpated through the upper incision. Yet Polk and others advocate and practice anterior colpotomy for this condition.

The alleged limitations and difficulties of vaginal section are exaggerated. The procedure is comparatively in its infancy. Continued application will broaden and specify the

[1] Southern Practitioner, vol. xviii, No. xi., p. 489.

limits of its utility, and increasing experience will augment our manipulative skill and perfect our operative technique.

In addition to the indications and supremacy of vaginal section for evacuating and draining pus in the pelvis, presently to be narrated, its most signal advantages have been exhibited in exploration of the pelvis for adherent adnexæ and small intrapelvic tumors. With the exploring finger in Douglas's space, an accurate diagnosis of retro-uterine tumors, inflammatory and annexial, can be easily made and surgical measures immediately instituted for their relief. In this connection I will refer to the practicability of inspection of the pelvic contents through the vagina with the patient in the dorso-Trendelenburg posture. This is readily accomplished by retracting the posterior wall and the opening in the fornix by the long retractor of Péan and lifting the uterus upward and forward under the symphysis by the anterior trowel retractor. The intestines gravitate toward the diaphragm and are further isolated by gauze pads. The appendages, if not adherent or having been freed, gravitate into the exposed area, where any appropriate conservative procedure can be applied under guidance of the eye. I have seen Pryor demonstrate the appendix through the vagina; and the possibility of treating pelvic abscess of appendicular origin through the vagina has been proposed.

It is unnecessary to suggest the ease with which pus is reached through the vagina. It is the natural approach and logical drainage avenue of the pelvis and its contents. The natural history of pelvic pus accumulations is to become walled off above from the abdominal cavity. Opening and clearing out these accumulations is virtually extra-peritoneal. It may then be classed in the category of minor surgery, but it gives major results. There is absolutely no shock. Patients thus treated give no more solicitude than a plastic case, and convalesce as smoothly as a curetting. The entire absence of risk warrants us in urging a patient to have it done. And about all patients so approached will give their ready consent. This is a very practical phase, and we cannot ignore the preju-

dice and possible refusal of patients, especially in private practice, to have more formidable operations.

We can change methods, but we cannot change the patient.

Apart from these theoretical and general considerations is their practical employment. The application of methods to individual cases should be the determining factor here as elsewhere in surgery. We are too prone to make cases fit methods. In patients ill from prolonged sepsis, damaged kidneys demand short anæsthesia. Anemia and asthenia preclude complete surgery, and simple vaginal section with drainage is elevated to the dignity of a life-saving procedure.

I would enumerate the especial indications for vaginal section, aside from explorative purposes, in the three following classes of cases:

1. Early cases of acute suppurating salpingitis.
2. Incipient post-puerperal peritonitis.
3. Large pus collections and true pelvic abscess.

In the first class will be found the cases from recent gonorrhœa and from septic abortion. As illustrative of the first type, I will mention the case of a girl aged nineteen years, who came to my clinic last summer with a flucuating, tender mass in the left side. She had had gonorrhœa a month, and presented herself with considerable pain and afternoon temperature. I curetted her in a hovel and made a posterior section. Upon incising the peritoneum the usual small quantity of free serum escaped. I found the tube fluctuating and tense. The right side was absolutely clear. I deliberately punctured the distended tube with scissors and withdrew them opened. A quantity of clear serum gushed forth, followed at the last by a minute quantity of pus and blood that could be easily seen as it trickled over the blade of the depressor. The cavity was irrigated with saline solution and packed lightly with iodoform gauze. The peritoneal opening was occluded with a small roll of the same material, which just entered it and filled the vagina. All gauze was removed on the third day. The peritoneal cavity had been entirely closed by lymph coagulum above the occlusive dressing. The sac

cavity was reirrigated and packed every second day. On the seventh day her temperature and pulse rose for the first time, and examination revealed a tender mass on the right side. On the eighth day I made another section above and to the right of the previous one, and found a "hydrosalpinx" in the descriptive rather than the pathological sense, which was in every way similar to the other one. *I believe those serous effusions in the Fallopian tubes were the preceding pathological conditions to pyosalpinx.*

If this be true and is the embryonal history of suppurating salpingitis in early gonorrhœa and other inflammatory processes, the prophylactic value of vaginal section will be the greatest boon yet given to infected woman.

In incipient post-puerperal peritonitis, Henrotin has taught us a simple lesson of pregnant truth. Associated with cleaning and disinfection of the septic uterus, vaginal section with drainage anticipates pelvic peritonitis and adhesions following puerperal infection. In these cases, at autopsies, I have seen literally puddles of pus in the cul-de-sac. The extension of the septic process and pus production was so rapid that nature had not time to encapsulate it. In this and in the ordinary adhesion cases of puerperal suppurative peritonitis it would be rash in the extreme to incur the dangers of suprapubic section, where the simpler, more rational vaginal evacuation with uterine disinfection and drainage has everything in its favor.

Opening of large pelvic abscesses *per vaginam* needs no espousal of mine. It is nature's safest method and was the practice of our elder criterions. I have seen the venerable Emmet evacuate large abscesses and drain them by a permanent tube fixed into the vaginal incision by silver sutures. He told me he had done it in selected cases for over thirty years. It was then, as now, the operation of choice. While it must be regarded in most old cases as temporary, and undertaken for the relief of immediately dangerous symptoms, there still are many permanent cures. A case has been reported of incision of an ovarian abscess with subsequent pregnancy, the

other ovary having been previously removed (McLaren). There are doubtless many similar cases, at least of restored functional activity in an ovary previously the seat of suppuration. Such reflections should make us chary of ruthlessly condemning appendages, especially ovarian abscess. No organ whose function can be maintained should be sacrificed (Montgomery.)

Should simple pus-letting not effect a cure, subsequent operation for removal of the relics of previous ravages can be done at another session without the dangers incurred in the presence of pus. This is the chorus of our contention.

In old recurring puriform disease, where both adnexæ are so hopelessly destroyed as to demand extirpation, I believe the uterus should also be removed. In such cases the condition of the patient forms the only contra-indication for complete ablation. Not simply because it is a functionless organ and can be removed with low mortality, but because it too is diseased, and if left will continue to produce pain and prolong the disturbances of the artificial menopause. It may still be the seat of hemorrhagic discharge, may be infected or re-infected with gonorrhœa, harbor tubercle bacilli and other germs, and incubate cancer-cells. In destructive bilateral suppurative disease of the appendages the uterus is enlarged by plastic exudation, may be infiltrated with pus or permeated with latent gonococci. The adhesions binding it in vicious malpositions are intensified after the removal of the purulent extension processes by readhesion of hollow viscera to denuded areas on the uterine wall.

Whenever the uterus is diseased by pyogenic infection beginning in its own cavity and extending and destroying the function and integrity of its appendages, it should be removed from below. The subpubic operation is preferable to the suprapubic, for the same reasons that vaginal section is preferable to abdominal section for pus in the pelvis. Moreover, it has been demonstrated that "whatever can be enucleated through the abdominal wall can also be removed through the vagina, and whatever it is impossible to enucleate through the

vagina cannot be removed by the abdominal method, except at the price of procedures incomparably more grave and more laborious" (Ségond).

The field of vaginal section is to prevent suppuration in early cases; to anticipate it in puerperal cases, and to save life in desperate pus cases. It is simple, surgical, and safe. Its application to the pelvic inflammatory diseases of women and to pus in the pelvis is one of the greatest surgical triumphs of the age.

DISCUSSION.

Dr. Joseph Taber Johnson, of Washington, D. C.—Mr. President: In the presence of so many gentlemen who are better able to open this discussion than myself, I feel a little reluctance to do so; but since I have been called upon I will not decline. I have listened, in common with everyone else, with a great deal of pleasure to this very radical paper, in which the author deals with pus in the pelvis and recommends the removal both of the uterus and its adnexa through the vagina instead of through the abdomen. For the sake of argument and in order to elicit discussion, I will take the opposite view to some extent. When a man reads a paper for discussion we should discuss it in the same spirit in which he has given it to us. There is no doubt that the vaginal method has a great many points in its favor, and it is being resorted to more and more in cases of large pus-collections in the pelvis; but those of us who have been familiar for a long time with the abdominal route can do many of these operations much more conveniently to ourselves, and we believe with much greater safety to the patient, than if we operated entirely by the vagina. I cannot agree with the essayist that the operation done through the vagina is attended with no risk. In patients operated upon through the vagina for the purpose of removing the uterus and its adnexa, or for large collections of pus high up in the pelvis, we frequently find the tubes adherent above the brim of the pelvis. It takes a great deal of careful manipulation to get them out clean. Where they are so high above the brim of the pelvis and so far out of sight that a complete enucleation is likely to tear the intestine, bladder, ureter,

or large vessels which are out of sight, the abdominal route is far safer than the vaginal. The vaginal method has much to commend it in cases of pus-collections which are low down, which can be manipulated, where we can feel fluctuation, where there is little distance between the anterior vaginal wall and collection of pus, so that there will not be much dribbling of pus between the vaginal wall and the abscess-cavity. In those cases the vaginal route is preferable, provided we do not intend to do what we call absolutely perfect surgical operations. We can do what our colleague, Dr. Price, has named life-saving operations, where our patients are in too desperate a condition to permit an abdominal section. When the consulting surgeon is called to see a patient with a temperature ranging subnormal for a few days and a pulse perhaps of 130 or 160, with sweating and other evidences of sepsis, there is no doubt but what such a patient can sometimes have her life saved by turning her around on the bed, using cocaine in the vault of the vagina, and letting out a quart of pelvic pus, washing out and draining the cavity. Surgery of that kind can save life for the time being. Dr. Noble, in his Atlanta paper, drew attention to the fact that many such cases could be operated on through the vagina with great benefit; but in order to get the patient well subsequently of painful adhesions and conditions which remain as a result of an imperfect vaginal operation which saves life for the time being, it will be necessary to do a radical operation through the abdomen in order to cure her.

The essayist has quoted Drs. Polk, Henrotin, Noble, and Kelly as doing the vaginal operation. These men have all done vaginal work in what they class as appropriate cases; but, from what I know of the practice and great success of all these gentlemen by the abdominal route, I am sure they will not be ready to abandon the abdominal method and do all of these operations through the vagina.

I believe these two operations have a great field. One method is for a class of cases which can be reached with greater safety for the time being through the vagina, not intending always at the time to do a perfect operation, but simply to get the patient in a condition so that a more perfect operation can be done later on to get the patient perfectly well.

Exploratory incisions, which the essayist referred to, I should indorse with emphasis in cases of puerperal sepsis where there is doubt as to whether pus is present or not. An opening can be made sufficiently large to admit the index-finger to let out pus or serum when present. The patient can be more thoroughly treated afterward if necessary. In these cases we should let the punishment fit the crime. We should do the operation which is the most appropriate. It should not be done upon cast-iron rules, but we should do the best for each individual patient. The circumstances surrounding the patient will indicate to us which is the best method to pursue. We have to consider the surroundings or environments of a patient in deciding which operation offers the best results.

I would draw attention to one point more, and it is with reference to the suggestion of the essayist that these operations are entirely safe. I would remind him of the fact that the men who are doing most of these vaginal operations—viz., Jacobs, of Brussels; Ségond and Péan, of Paris; and Doyen, of Rheims—have a greater number of injuries to the abdominal viscera from manipulations through the vagina than operators of equally large experience have had in operating by the abdominal route. Jacobs, in a paper read before the American Gynecological Society of Baltimore, reported four hundred vaginal hysterectomies for pus in the pelvis and other causes where he considered extirpation justifiable. Of this number he reported twelve serious accidents to the viscera, which were made by his fingers and clamps without his knowledge at the time. The important point to which I wish to draw attention is that these injuries to the bladder and viscera are out of sight and out of reach. If similar injuries are done by the manipulative and enucleating fingers in the abdominal cavity, we have an immediate opportunity to repair them; but as injuries to the bladder and rectum made through the vaginal route are not often recognized at the time, there is less opportunity to repair them.

Dr. Charles P. Noble, of Philadelphia, Pa.—I did not come here to participate in this discussion, but rather to listen; but as you have so kindly invited me to speak, I cannot decline. This subject is one which is interesting to every practical operator, and myself among the number. Dr. Johnson has pre-

sented the matter so well that I fear what I shall have to say will be more or less of a repetition of what he said. I think the Doctor struck the keynote of the whole matter when he said that we should practise a judicious eclecticism. I do not feel that the abdominal or the vaginal method has all the advantages, but if restricted to one or the other I should choose the abdominal rather than the vaginal route.

The first point which I would touch upon is the objections which are urged against the abdominal route in favor of the vaginal. We hear so much about it now. It is not long since that almost everybody who advocated the vaginal route urged, as one of the principal objections against the abdominal route, the large percentage of hernias which followed abdominal operations. It so happens that last week I tabulated my operations for some years in preparing a paper on buried sutures in abdominal operations. In a little over four years I have operated on 297 cases through the abdomen, using the buried suture in closing the abdominal wound. In these cases there were 7 which suppurated, while the 290 healed by primary union. Of the 7 cases which suppurated, 1 has had a hernia. Of the 290 other cases, 1 was done for a large umbilical hernia, and in this a recurrence followed; but aside from these two cases I have had no hernias whatever in my work for the last four years where the buried suture was used; so that if the patient is in a condition to permit us to do ideal work the question of hernia is such a small matter that we can leave it out of consideration. This was one of the stock arguments against the abdominal method, and we can omit it hereafter. Either by using silkworm-gut or silver-wire suture hernias can be reduced to an insignificant percentage, and perhaps it might be done also by chromicized catgut suture.

The next point urged against abdominal operations is the great amount of shock as compared with vaginal operations. My experience does not bear this out unless we operate on the particular class of cases alluded to by Dr. Johnson, namely, the desperately bad ones. Shock plays a small *rôle* in abdominal work. The percentage is small where shock occurs. So far as I am personally concerned, I have had more shock following vaginal hysterectomy than abdominal operations, so that I think there, again,

the argument against the abdominal method is not well founded. These are the principal objections urged against the abdominal method.

The advantages of the abdominal method are those to which Dr. Johnson has called our attention so forcibly, and I can only say that I agree with him entirely. The abdominal method has many advantages, particularly as we can do more ideal work; we can leave the patient in a condition when we are very much more certain that she will have much less trouble in the future than when we operate through the vagina. Those who practise the vaginal method, if the case is at all bad, do not attempt to do an ideal operation. Those of us who have had experience with both methods know that if a piece of ovary or a tube is left in it may give rise to further trouble.

There was one point which Dr. Johnson did not bring out, and that is, the question of diagnosis is not accurate in a considerable percentage of pelvic cases. It is sometimes not possible before operation to make an absolutely certain diagnosis. We all know that. From that standpoint we are in a very much better position to deal with a case in operating from above than from below. There are many cases where you cannot diagnosticate between appendicitis and pelvic inflammation. We have all operated upon them. If we operate from above, we are perfectly able to deal with the case, whereas in operating from below we are not. From the standpoint of dealing with whatever complications may be present, there is no question about the advantages of the abdominal route. I was glad Dr. Johnson laid stress upon the percentage of injuries to the viscera which follow the vaginal method of operating. We all know that one prominent operator of the vaginal method, in operating on a dozen or fifteen cases in this country, clamped both ureters in one case, so that the patient died from suppression of urine. Not only are both ureters clamped quite frequently by the vaginal method, but one ureter much more frequently, so that ureteral and vesical fistulæ have been quite common. I have a patient under my care at the present time who has a vesical fistula after so-called anterior colpotomy; and this case, operated on in Berlin, still has a fistula necessitating an operation to close it. So far as my own observations go they bear out the frequency of these complications in operating through the vagina.

Another objection to the vaginal method, in a large way, is for cancer of the uterus. Those of us who have operated for cancer of the uterus feel that the only chance of curing the case, especially in a cancer of the cervix proper (not the cauliflower growth or cancer of the body of the uterus, but the more common one of cancer of the cervix proper) is to keep away from the cervix; and, unless we do this, there is no reason to expect a radical cure. In attacking these cases through the vagina the usual percentage of recurrences is about one hundred. We cannot adopt the vaginal route with the expectation of doing as good work as when we operate from above. In such cases the patient is left in so much better condition in operating through the abdomen that it must appeal to all of us.

Some time ago I saw Dr. Ségond do a vaginal hyterectomy for simple pus-tubes. No one, possibly, could have done the vaginal operation more neatly and skilfully than he did. The uterus, tubes, and ovaries were taken out entire and the operation completed in about half an hour. The same operation would have been completed in about the same length of time if a hysterectomy had been done from above. Had the operation been done from above, and the uterus amputated at the internal os and the peritoneum stitched over the field of operation, when the patient was put to bed she would have been in a position to immediately recover; whereas, in operating from below it is so far inferior to the abdominal method that it is essential, in order for any of these patients to recover, that they have a localized peritonitis to shut off the opening in the vagina. Gauze is packed in to favor localized peritonitis. It is essential that we have sloughing, where the clamps are attached to the broad ligaments, to control hemorrhage, so that, as a matter of fact, the patient does not begin to get well until a week or ten days after the operation is completed. In all cases in which either method is available with the same primary mortality the advantage lies with the abdominal route.

Before closing I must say I agree entirely with Dr. Johnson and others who have attacked the vaginal method of operating that when we have large accumulations of pus to treat the vaginal route is best. So far as my experience goes the mortality is high when we operate from above. Twenty to thirty per cent.

would represent the mortality with large collections of pus operated on from above where the appendages are removed. I think those cases can be simply drained through the vagina with practically a *nil* mortality, and then subsequently the patient can be operated on radically, when necessary, and in many cases a radical operation will not be necessary. I think this line of operation will save many lives which would otherwise be lost. Perhaps I might refer to one other class of cases in which, it seems to me, the vaginal route offers a good deal in the future. It has been the usual practice in the past, and considered sound, that when we have been called in to see cases of localized pelvic peritonitis, if the life of the patient was not jeopardized, to permit the case to run its course until the acute inflammatory trouble had subsided, and then, if necessary, to deal with it by radical operation. The method which has been worked out by Henrotin and Pryor, to operate upon these cases in the acute stage by opening the vagina, freeing adhesions, and establishing free drainage, it seems to me, is a rational and promising procedure; and the argument which they advanced—that by operating upon these cases early we can prevent the destructive changes which take place in the adnexa—I think must appeal to everyone of us. There is certainly very little hope of restoring a chronic pus-tube to functional activity if inflammatory changes have been going on for years or months; but, on the other hand, if we can deal with the case within a few hours or days of the onset of the inflammatory trouble, there is sound reason for believing that the recuperative powers of nature may restore parts to functional integrity. This procedure offers more in the line of progress than anything else which has been advocated per vaginam.

Dr. Howard A. Kelly, of Baltimore, Md.—This paper is exceedingly timely; but anyone who follows the two gentlemen who have discussed it labors under a disadvantage, for they have spoken so well in summarizing the experience of leading operators, including their own, that they have left little to say. In discussing this matter I recall a meeting at Dr. J. Taber Johnson's, in Washington, when I spoke of this topic of pus in the pelvis and how to treat it. I insisted then on the basis of a large experience, as I will insist now on a basis of a still larger

experience, that women with pelvic abscesses or pus in the pelvis ought to be given a chance to recover with all their organs by simply evacuating the pus. Simple vaginal section or puncture of the prominent abscesses to get out the pus, followed by drainage, ought to be done first, and most cases will recover by this treatment. In some of them the adhesions will clear up, in others they will remain; but the patients will have no discomforts and will keep their tubes and ovaries. The object of removing the uterus, tubes, and ovaries by the vagina, according to the advocates of the vaginal method, is the excellent drainage which is afforded by that method. Now, it is not necessary to take out the uterus to get drainage. I can get free drainage by making a wide vaginal incision, breaking up adhesions, and inserting a drainage-tube.

I recall in this connection a case which impressed me very much that I saw in Cumberland two years ago. I was called to see a patient who was in a typhoid condition, unconscious, muttering, with a rapid, flickering pulse, and a hard, dry, brown tongue. She looked like a patient in the last stage of typhoid fever. When she was placed on the table and her abdomen opened I found it utterly out of the question to attempt to do anything radical. The pelvis was literally choked by a large pelvic mass, and the small intestine, rectum, and bladder were so glued together that the pelvic viscera could not even be outlined. I could differentiate the uterus and ovaries only with the greatest difficulty bimanually. I then made an incision posterior to the cervix, guided by the hand in the abdomen, taking extreme care, as I punctured behind the cervix and let out a large collection of pus and gave efficient drainage, not to hurt any of the abdominal viscera; to-day the woman is well. I operated on another case on Wednesday last, just before I left home to come here. The patient was in an extremely low condition. She had a heart-lesion, and, in addition to a rapid pulse, was extremely emaciated, with pulmonary phthisis, and a mass choking the pelvis. I made a posterior vaginal incision, let out a quantity of pus, and established good drainage. I might contrast this case with one upon whom I operated on last Monday for the same kind of disease, there being a marked accumulation of pus. The rectum was glued to the bladder. I could hardly tell whether

the uterus, the right tube, or the ovary was affected, as everything was so agglutinated. I opened the vaginal vault, but could not satisfactorily distinguish from below the structures, which were all too high up. I was now able to palpate bimanually with one hand inside the abdomen and the other in the pelvis beneath the adhesions, and found that the uterus was movable, and I then enucleated the entire mass.

I would urge, therefore, that whenever possible that pus be drained from below by vaginal section posterior to the cervix, and so give the patient a chance for perfect recovery. If she does not recover, the question may then be considered whether to remove the inflamed structures or not.

To show my faith in this procedure I might cite a case operated on last spring. It was a case in which there were large pus-tubes high up in the pelvis. I opened the abdomen first, because I could not get at them through the vagina. I then loosened the tubes, dropped them onto the pelvic floor, evacuated their contents, made an opening into the peritoneum posterior to the cervix, drained them into the vagina, and got a perfect result, and the patient was not mutilated in any way.

I hope, Mr. Chairman, that the conservatism which has been urged here to-day will prevail, and that the members of this Society will do their utmost to conserve these important organs. Always first try to save, and only sacrifice under compulsion, after every effort at conservatism has been made.

Dr. L. S. McMurtry, of Louisville, Ky.—The subject under discussion is one which is of great interest to us. It is still in an unsettled state. In the remarks I have to make I simply wish to call attention to one or two points. In the first place, there has certainly been a great impression made upon the profession in the last two years by the vaginal method of operating for pus in the pelvis. We are apt to lose sight of the fact that this is by no means a new procedure. For a long time it escaped the attention of the profession of this country, it having been superseded by the abdominal method of treating these cases, and has recently been revived. I remember a few years ago, in Washington, that a very able presentation of both sides of the subject was presented by Dr. Maury, when he called attention to the work that was being done by Péan and Ségond in advo-

cating vaginal hysterectomy for the treatment of suppurative pelvic inflammations as a superior method to the abdominal incision. This operation did not take a very strong hold on the profession in this country until our distinguished colleagues from France visited America and demonstrated their great dexterity in operating by this method. It will be remembered that Dr. Battey, in his original operations on the ovaries, attacked the pelvic organs through the vault of the vagina.

The method which has been alluded to by Dr. Noble, of treating pelvic accumulations of pus by vaginal puncture and drainage, and which Dr. Kelly practised so long ago as 1889 and demonstrated to the profession at that time, has been, so far as I am aware, the universal practice of abdominal surgeons for a long, long time; that where a thorough and complete operation could not be done, vaginal puncture for pus-accumulations and draining them away should be resorted to. So we must admit there are a great many features about this method of operating that appear novel which are simply the revival of methods which have been abandoned.

One word in regard to the operation through the vagina for pus in the pelvis. The French surgeons have never been successful abdominal operators. Gentlemen who have seen Ségond and Péan and Richelot operate must have noticed a great difference in the work they do suprapubically and that they do infrapubically. To see Ségond do a vaginal hysterectomy creates the impression of a sleight-of-hand performance—he operates with such remarkable dexterity. The French school of surgery has always cultivated the vaginal method of treating pelvic diseases, but have never attained a high degree of skill in operating suprapubically. I am confident, Mr. Chairman, that a good deal depends upon the personal equation as to which is the best method. Many surgeons can operate with great ease through the vault of the vagina, and for them it is probably best to treat a given case by that method; but if we compare the results that have been attained by the best operators of the French school of surgery with the best results of the best English, American, and German operators, we must admit that there is no superiority whatever in the vaginal over the abdominal method in the treatment of these cases. Dr. Noble mentioned Drs. Henrotin and Pryor as

advocating an exploratory operation through the vagina. It is better to make an exploratory incision above the pubes.

The sacrifice of the uterus in the majority of cases of suppurative pelvic inflammation is unnecessary. All this talk about the uterus being infected, of its producing neurotic disturbances afterward, and of it remaining a source of trouble, is far-fetched. While there are cases, particularly puerperal cases, of suppurative pelvic inflammation where it is necessary to remove the uterus, it is not sufficient to establish a rule. Surgery should be confined within the limits of removing only such organs as are necessary for the complete cure and restoration of the patient.

Dr. J. Wesley Bovée, of Washington, D. C.—I was pleased with Dr. Haggard's paper. We have heard and read a good deal of late about the vaginal and abdominal methods of operating for pus in the pelvis. I would object to anterior colpotomy in dealing with pus cases unless the accumulation of pus was on top and in front of the bladder. We cannot drain these cases through the anterior vaginal route, and we cannot reach the accumulations of pus in many cases. That is very certain.

I am glad Dr. McMurtry said that it is unnecessary to remove the uterus at the same time we do pus-tubes, although I remember Dr. Kelly told us in Atlanta to remove the uterus down to the internal os when we did an abdominal section to remove suppurating appendages. I do not think this is necessary. I said at Atlanta that we should curette the uterus before the removal of the appendages, at the same sitting, or, if the patient was not able to stand the operation at that time, to wait until she was able to stand a curettement. If necessary, do it then. I think the uterus can be saved in those cases unless it is infected very seriously.

Another point I would call attention to in pus-accumulations in which we open through the vagina. We have seen pus-accumulations in the pelvis where there was a sac composed of Fallopian tubes filled with pus and another alongside of the ovary. We have seen cases where there would be an abscess of the ovary, an abscess of the Fallopian tube, and a large pericæcal abscess—three separate cavities on one side. You would drain one and get a quantity of pus out of it, but you have not done all that is necessary. I do not wish to be under-

stood as opposing the vaginal route in very urgent cases. All of these cases do not do as well as Dr. Kelly would lead us to suppose. Dr. Kelly did not mention any cases which turned out badly. He told us that most of them would be cured by vaginal puncture and drainage. He said even if they were not cured by this method they might by operative procedures subsequently. I had a case come under my care which will illustrate my point. The case occurred during the past summer in my service at the hospital in Washington. It was a large pus-accumulation. I went away at that time on my vacation, and Dr. Fry, my colleague, seeing the case was urgent, opened through the vagina behind the uterus and let out a large quantity of pus. When I came back the woman was having a temperature of 101° to 104°; sometimes it reached 105°. Her pulse was never below 115 up to the time of the second operation, which I did about a week ago. At that time she had a profuse fecal discharge from the opening in the posterior vaginal route. I had Dr. Fry see the patient again, and to see what could be done. At that time she had a fecal fistula which had developed about a week before I operated a second time. Dr. Fry saw her as requested and said that there was nothing else to do but to resort to vaginal or abdominal hysterectomy. I proposed to remove the uterus and to see if I could get out some of the material that was in there, pack it, and close the fecal fistula, as this has been done in many cases. The removal of the uterus did not take more than five minutes. The organ was small and off to one side, and very easily pulled out. I thought my work was nearly done, but in working up above I found a lot of material which reminded me very much of a cauliflower-growth on the cervix. A good deal of this was scooped out. I do not know whether I injured the intestines or not, as we cannot always tell. This mass extended high up and was broken down. I removed a good deal of it and then packed the cavity with gauze. The woman died in twenty-four hours from the shock of the operation. If this woman had had a radical operation done at the beginning, the prospect of her getting well would have been much better.

Dr. McMurtry spoke of Battey's operation, but it is different from this procedure. In his cases Battey operated practically upon normal ovaries, and in not 3 per cent. of the cases operated on were there any adhesions.

I am inclined to believe that the matter of personal equation does not enter into this work as much as Dr. McMurtry would have us believe. While it may to some extent, I think in this country we have a great many men who can do good work by both the vaginal and abdominal methods, and I think it is a matter of methods rather than of personal equation.

Dr. R. B. Maury, of Memphis, Tenn.—During the last two years I have made it my duty to study thoroughly the subject of vaginal hysterectomy. I have done quite a number of vaginal hysterectomies without any mortality, without any accident, and without any unpleasant results. But I would not undertake to say, Mr. President, that we ought to try to substitute it for laparotomy. They are both operations that we must avail ourselves of according to the circumstances of the case, and for the purpose of illustration it will take but a few moments to recite the histories of two cases which have occurred within the last thirty days, and which I think will show the advantages of the two methods.

One of these was a young married woman who had been an invalid for two years in consequence of an inflammation following parturition. She had been confined to bed, had been under good treatment, had been curetted, but there was no improvement in her health. The marriage relations had been suspended for a year, and part of the time she had been insane. The uterus was deeply lacerated on both sides; it was fixed in the pelvis, and there was a stream of pus coming from it constantly, and in consequence of that a distressing vaginitis. Under these circumstances it occurred to me that, in consequence of the very deep-seated disease of the uterus, as well as of the appendages, the extent of which was difficult to estimate, vaginal hysterectomy was preferable; but before deciding on what was to be done I made use of the method of Doyen, which we all understand, the initial step of which is to open the posterior vaginal pouch and explore the appendages. I found there was no pus in the tubes and ovaries, but that they were to a considerable extent atrophied and adherent, and then the uterus itself was removed. The appendages could very easily have been removed, but I did not consider it was necessary after examining through the opening made by the removal of the uterus. In that case I

considered vaginal hysterectomy was to be preferred to abdominal hysterectomy for removal of the appendages.

On the other hand, the second case I would relate was one of which there was a very unsatisfactory history. The patient sought relief because of pain in the left side associated with a circumscribed hard tumor just above and behind the uterus on the left side. I decided to do a laparotomy in that case. I thought I was going to operate on a small uterine fibroid. I found everything adherent, and after putting the patient in the Trendelenburg position at least thirty minutes of hard work were necessary to enucleate a pus-tube high up and behind the sigmoid flexure; and after the enucleation was complete, in order to control the bleeding, which was not severe, it was necessary to do something to arrest it, and a ligature was passed around the ovarian artery close to the pelvic wall.

I mention these two cases to illustrate the advantages of the two methods.

Dr. W. E. B. Davis, of Birmingham, Ala.—I shall only occupy a short time of the Association. The practice of incising abscesses, as has been pointed out by the essayist, is so old that it does not require discussion; but the practice of opening pus-tubes by vaginal section is not so old, and it is a procedure that I do not think Dr. Kelly recommended in 1889. Unquestionably the operation of vaginal incision for pus confined to the tubes and ovaries is one that will save important organs in a good proportion of cases. In all cases of large collections of pus in the pelvis I believe nothing should be done more than to incise the abscess, and later on, if there is a mass found, curette the uterus, make a vaginal section, open the mass containing the tube or ovary, and pack with gauze. If you have entered the general cavity in doing this, do not content yourself with making an incision into the tube, but break up the adhesions behind the uterus and insert gauze into the pelvic cavity, so as to prevent a secondary abscess from forming, which I have had occur in one or two cases.

With reference to the argument against the adoption of the vaginal operation for small collections of pus—that we may get hemorrhage which we cannot control—I will say that in cases of vaginal section the surgeon should be prepared to do an ab-

dominal section, if it should become necessary; but he will rarely find it necessary. If he should, it would occupy only a short time. We have learned from the work of French surgeons that we can leave tubes and ovaries after hysterectomy, having made incisions into the diseased parts, and the patient will get well, demonstrating that what we need for the relief of pus-tubes and ovarian abscesses is thorough drainage. It is unnecessary, however, to remove the uterus to establish thorough drainage. Coming more to the point we must conclude that the practice of total ablation of the uterus and its adnexa by the French surgeons is not necessary in a large per cent. of the cases in which it is practised by them. I think that the claims made by those who are advocating vaginal incision and drainage for pus-tubes will do good, because there has been such an extreme stand taken in the last few years as to the total ablation of the uterus and its adnexa that if there had not been some conservatism manifested it is hard to tell what would have resulted. Surely, the practise of gynecology would have been brought into disrepute.

Dr. Haggard (closing the discussion).—I feel very much gratified at the free discussion which my paper has elicited. In the discussion some of the speakers wandered away from the subject, and I felt like saying, when one of them was speaking, although he did not hear the paper, that the subject before us is pus, and nothing but pus.

The first speaker, Dr. Johnson, although quite formidable in his advocacy of the abdominal route, did us great honor in that he entirely agreed with our proposition for incision and evacuation of large pus-accumulations in the pelvis. It is what is called a life-saving procedure, and this was our chief contention. Dr. Davis has said that it is unnecessary to insist upon the advantages of this old classical procedure, but I have had such a recent and unfortunate experience that it has been indelibly impressed upon me.

A week ago to-day in my clinic at the City Hospital I opened the abdomen of a woman who had a huge abscess reaching to the umbilicus. She had a temperature of 103° at the time of operation. Section revealed a huge mass on the left side, and in attempting to free the adhesions I opened into a large pus-pocket between the uterus and bladder. The patient was in the Tren-

delenburg position and the intestines protected by flat sponges, but the abdomen was deluged with as stinking pus as I have ever smelled. I found a typical sausage-shaped pyosalpinx on the right, and enucleated it without rupture. To secure perfect drainage and to do complete surgery I deemed it necessary to remove the uterus, which was done in good time. Yet, in spite of everything we could do with gauze-packing, vaginal irrigation, and finally through-and-through continuous irrigation with a canula, allowing hot saline solution to flow through the abdomen and out through the vagina, the patient died with overwhelming sepsis on the third day.

These cases are encountered in the practice of everyone who has done much abdominal surgery, and it strengthens me in the belief that pus cases should be treated by vaginal incision and later by whatever procedure is needed.

The only case I narrated in my paper was the one to which Dr. Johnson referred. I did not resort to vaginal section because of the meagre surroundings. If I had had that patient in my private infirmary, in a well-appointed home of her own, or at the hospital, I should have done the same thing. If we get these cases of gonorrhœal infection early, when they are in what might be called the "serous stage," and resort to vaginal section and evacuate the serum or pus, I contend it is the greatest function of vaginal section, and will do more for women afflicted with suppurative pelvic disease than anything we have ever achieved.

One of the speakers strayed a little from the subject and advocated some of the well-known things in abdominal surgery, one of which was the reference to the prevention of hernia. I have seen the gentleman (Dr. Noble) close the incision in such a way that his patients would not have hernia. Very few good operators have hernia following their operations, and the men who resort to the vaginal route do not fear it particularly. The same is true of shock. We fear sepsis because, in the class of cases of which I have spoken, sepsis has run the mortality up to 18.5 per cent. in the best hands in this country. It is unnecessary to repeat that the mortality of vaginal section, as it is practised at present, is practically *nil.*

In reference to the disadvantages of vaginal section, namely, the liability to vesical and fecal fistula, operators of experience

consider that the dangers are no greater by one method than by the other; that they are about equal. We have thorough drainage by the vaginal method, and the injuries to the bowel sometimes get well of themselves. The disadvantage of leaving pus-sacs in doing a vaginal operation is not an argument against this method of operating, as it is just as applicable to abdominal section. Ségond, in his paper on this subject, which was read before the American Gynecological Society, said that whatever can be enucleated from above could also be removed through the vagina, and whatever could not be removed through the vagina could not be enucleated from above save at the price of procedures incomparably more grave and more laborious. The opinion of this great vaginal hysterectomist should be worth something to us.

One point with reference to exploration by the vaginal method. I have learned to have the greatest respect for the opinion of my distinguished teacher, Dr. McMurtry, but I wish to enter a plea for explorations through the vagina for pelvic inflammatory conditions as contrasted with the more formidable operation of abdominal section for the same purpose. Of course, the indications for the abdominal method in pathological conditions which are outside of the pelvis or high up are not to be disputed. Vaginal section for the diagnosis of adherent adnexæ and retro-uterine tumors appears to be the greatest triumph that this method has given us, because we can accurately diagnosticate the condition through the vagina and apply any conservative procedure that is necessary; at the same time we subject the patient to absolutely no shock. She is put to bed with gauze-packing in the vagina, which is not removed for three or four days, and one would think she had nothing more than a curettement done. On the contrary, for small pelvic pathological conditions you put the woman to bed for three or four weeks after an abdominal section. It, therefore, seems to me that exploration through the vagina is much more preferable. Furthermore, I have contended that an exploratory vaginal section should be the initial step of vaginal hysterectomy.

CHOLELITHIASIS, WITH REPORT OF CASES.

By A. Morgan Cartledge, M.D.,
Louisville.

The importance of this subject seems to be just dawning upon the profession, and we feel sure that its history as written at the close of the next decade will present one of the most brilliant achievements in surgery. When we consider that on an average, probably, one of every ten persons is affected with gallstones, we are in a position to appreciate the great frequency of pathologic processes in the biliary ducts, including the gall-bladder.

The old are most prone to gallstones, also persons the subject of pre-existing disease in this region, such as cancer of the liver and adjacent structures. Women are more prone than men in the proportion of five to two. Tight-lacing has been ascribed as a cause of this, but sedentary occupation, with its attending torpor of secretion and excretion, is probably more responsible for this difference.

The essential pathology of gallstone-formation consists in an altered condition of the mucous membrane of the bile-passages. Once there is destruction of the epithelium, as from extension of inflammatory processes in the duodenum or invasion of the ducts by the colon bacillus, or circulatory disturbances from the pressure of growths or mechanically, the conditions are at once created for a deposit of cholesterin, carbonate of lime, and bile-pigment. The nucleus of such deposits, as well as much of the component mass, often consists of dead epithelial cells and inspissated mucus from the pre-existing catarrhal inflammation.

The well-known tendency of Americans to so-called gastric and duodenal catarrh induced by peculiarities of living, such as rapid eating and exertion at a time when large quantities of food are still in the process of digestion, would seem to render them especially prone to this affection.

In detecting the existence of gallstones too much stress must not be laid upon the presence or absence of jaundice. As a matter of fact, most of the cases of gallstones that apply to physicians for relief have never had jaundice, hence in the past received treatment for something else, the true nature of the disease never being recognized. Severe pain in the right hypochondrium and epigastrium, followed by jaundice which usually passes away in a few days, marks the passage of a gallstone so plainly that no diagnostic skill is required to surmise the nature of the condition. Or, again, severe, sudden pain, followed by continuous jaundice, usually indicates an impacted calculus in the common bile-duct. These are matters of common observation, and need not be dwelt upon in dealing with the symptomatology of the disease. The point in recognizing gallstones that deserves most consideration is that such symptoms as have already been enumerated probably do not exist in more than one-tenth the number of cases of gallstones that apply to us for treatment. Many patients suffer for years with gallstones in the gall-bladder that are too large to pass the cystic duct, hence never become engaged in the common duct to produce jaundice. Such cases are most often characterized by attacks of pain, usually requiring several hours or days to attain their greatest severity, with a variable period of persistence, followed by complete relief, the pain subsiding rather suddenly. The explanation of such attacks of pain is to be found in the occlusion of the cystic or gall-bladder duct by the stone or stones and the distention of the gall-bladder with mucus; as soon as the passage is cleared by shifting of the stones, the result of the paroxysmal efforts of the muscular gall-bladder, the mucus escapes into the common duct and quiet ensues until another attack. All the pathology in these cases is con-

fined to the gall-bladder and its duct; and from the ease with which the condition may be dealt with, it is especially important to recognize it before the graver complications of common-duct obstruction occur. During the attacks of cystic-duct obstruction a careful search will usually reveal the enlarged and distended gall-bladder. If we would carefully examine these patients instead of following the routine practice of calling it an attack of colic or indigestion and giving a dose of morphine, we would often establish a diagnosis of gallstones in the gall-bladder at a time when operation would give the most brilliant results, and at a time when such treatment may be truthfully said to be preventive of the dangers of gallstones.

Another and very frequent form of this disease is where the stones are very small and very numerous. I have removed more than 1400 distinct but small calculi from the gall-bladder. In such cases one or more stones are passed every day or every few days; the cystic duct being much smaller than the common duct, the little stones usually pass very easily without producing jaundice. However, they give rise to a slight pain and feeling of discomfort, especially in the epigastric region, which lasts from a few minutes to an hour or more. I opine that such as these have taken most of the pepsin and other lauded digestive agents that have been made.

To recapitulate this part of the subject: We recognize gallstones attended with sudden, severe pain and jaundice, or obstruction, either temporary or permanent, of the common duct.

Calculi confined to the gall-bladder and cystic duct, attended with periodical pain, without jaundice, and characterized by a tumor composed of the distended gall-bladder at the usual situation. Such cystic accumulations vary in size from a hen's egg to that of the head. Occasionally the cystic-duct obstruction fails to be relieved, and the greatly distended gall-bladder may rupture, or, what is most common, inflame and become adherent to adjacent organs or the anterior parietes.

Cases characterized by slight pain in the epigastrium of vary-

ing intensity and duration, but without tumor or jaundice. Differential diagnosis—cases characterized by jaundice: From cancer of the bile-ducts, duodenum, and adjacent structures. By slow onset of symptoms in cancer, with slow approach of pain and jaundice, progressive emaciation and cachexia. From catarrhal inflammation of the bile-ducts: By absence of pain in the latter, with history of gastric disturbances. From abscess of the liver and surrounding structures: The character of the pain and the existence of fever will usually suffice to make a diagnosis, also the relation as to time between the onset of pain and the appearance of jaundice. In certain cases, however, nothing but an exploration will decide the point at issue.

The cases characterized by a tumor of the gall-bladder are to be differentiated from, first, displacement with fixation of the right kidney. I mention this first for the reason that I have seen two cases, both in females, where the right kidney was displaced forward, upward, and inward, just in the situation of the enlarged gall-bladder; in both cases the kidneys were fixed by adhesions; both were subject to attacks of kidney-pain, probably from twisting of the pedicle. The diagnosis of distended gall-bladder was made in both, only to be disproved by exploration. Of course, if the tumor moved freely with movements of the diaphragm and liver on respiration, the probability of such an enlargement being the gall-bladder would be almost certain, but oftentimes the gall-bladder is bound in such a way by adhesions as to prevent its motion with respiration. Second, an abnormally high, inflammatory mass about the appendix might be mistaken for the gall-bladder. The history of the case, with a careful examination of the upper margin of the enlargement, usually suffice for a differentiation.

Abdominal neoplasms, such as mesenteric, omental, and intestinal tumors, can usually be differentiated from the enlarged gall-bladder by the greater range of motion they possess. Often, however, exploration is the only sure means of determining.

Cases of gallstones without tumor and without jaundice are to be differentiated from colic, attacks of indigestion, and so-called gastralgia. From the first, colic in this region of the abdomen could only be gastric colic, and that would be most severe in the left hypochondrium and epigastrium, whereas in the passage of small gallstones the right hypochondriac and epigastric regions are the especial points of pain.

From indigestion the differential points must be left with the physician, guided by a careful observation and investigation of all features of the case.

As to gastralgia, it seems to be a nice, musical term, which, if it expresses anything, expresses our ignorance of some real lesion about the stomach or adjacent organs.

In competent hands the surgery of the gall-bladder is today the most satisfactory in its results of any in the abdomen, and when we reflect how often it could be made preventive of the dread consequences of calculus disease, it should urge us to a due appreciation of the great advantages to be derived from a recognition of the gallstones, if possible, before jaundice has become a symptom.

A brief history of fourteen cases subjected to operation is appended. Of these the calculi occupied the gall-bladder or cystic duct, or both, in thirteen patients. In one case the common duct was alone the seat of obstruction. This was the only fatal case in the series. Jaundice had existed for eight months.

Case I.—Mrs. B., the wife of a physician, aged thirty-six years, gave the history of periodical pain of a very severe character in the hypogastric region. Examinations by many physicians failed to detect any cause for her suffering. There was no jaundice. In the absence of anything more conclusive, her trouble was finally considered and treated as gastric neuralgia.

September 19, 1892, I was requested to see her in consultation with her physician and Dr. Scott. The latter, having seen her the day previous, made the diagnosis of overdis-

tended gall-bladder from impaction in the cystic duct. In this last attack, which was most severe, requiring partial chloroform-anæsthesia for three days, there was a slight tinge of jaundice. On examination of the patient I could detect a small tumor, about three inches in length by two inches in width, in the region occupied by a distended gall-bladder.

Operation the following day, September 20th. Vertical incision at the outer border of the right rectus muscle, extending from the costal arch down to the lowest point of the tumor. The gall-bladder was found very tense and free from adhesions. By aspiration two ounces of clear mucus were withdrawn. The gall-bladder was incised and several large stones removed, mostly from the cystic duct. The last of these stones was so deeply placed as to impinge upon the common duct, thus causing the slight jaundice from which she suffered. The gall-bladder was stitched to the parietal peritoneum, drained with a rubber drainage-tube, and the abdomen closed. Her recovery was afebrile, rapid, and uneventful. Bile flowed freely through the fistula for ten days, after which time it ceased. Her health has been perfect ever since.

Case II.—Mrs. K., aged twenty-five years. Four weeks before she was seized with severe pain in the region of the stomach and gall-bladder, which lasted the greater part of the night, necessitating morphine hypodermatically for its relief.

Incision as in Case I. The gall-bladder was found to be at least five inches in length and very tense, about the shape of a large bologna sausage. The fundus was drawn up into the abdominal wound, a flat sponge placed behind it, and an incision made which emptied it of about six ounces of clear mucus. Twenty-four calculi, varying in size from a small chestnut to a half-pea, were removed from the gall-bladder and cystic duct. Drainage by rubber tube, after stitching the gall-bladder to the parietal wound. Bile flowed for about twelve days, when the fistula spontaneously closed. The patient required no opiate, and made a rapid and complete recovery. Has remained in perfect health since.

CASE III.—Mrs. S., aged twenty-six years, the wife of a physician, had suffered for three years with paroxysms of pain. A small tumor was noticed two years ago in the region of the gall-bladder, which was attended with circumscribed peritonitis. The trouble at this time was thought to be mesenteric tuberculosis. The history of the case was somewhat obscure. There was marked impairment of the general health, together with aching and gradual enlargement of the tumor in this region. Vomiting was a common symptom. There was no jaundice. The shape of the enlargement was not that of an overdistended gall-bladder, besides the situation was not typical, it being too far to the right and a little high up. This enlargement was broadest at the base and not at the fundus. Cystic degeneration of the kidney had been diagnosticated as probably the trouble.

After careful and repeated examinations of this lady I believed the trouble to be calculus impaction in the cystic duct. Operation revealed an enlarged gall-bladder, with numerous adhesions. The border of the liver was drawn down, very much thinned, and adherent over most of the tumor. The gall-bladder was found to contain three or four ounces of the normal secretion. This was drawn off and five very large calculi found impacted in the duct, causing complete occlusion. These calculi were quite as large as the largest chestnuts. The gall-bladder was stitched in the usual way to the abdominal parietes and drained. The lady made an uninterrupted recovery, and has since experienced the greatest improvement in her general health.

CASE IV.—The history of this case is of great importance as showing the probable outcome of most of these cases if left to themselves. This case proves that calculus or other impermeable occlusion of the cystic duct must eventually lead to one of three things: either rupture of the attenuated, overdistended gall-bladder into the peritoneum, inflammation and suppuration, with adhesion to some part of the alimentary canal, or adhesion to the abdominal walls, the abscess breaking through and emptying itself without.

The patient, a physician, aged thirty-two years, had always been very robust, his usual weight being 217 pounds; had never been sick in his life until two years ago. While making a visit to a patient he was seized with severe pains in the region of the gall-bladder, which he at once thought was an attack of biliary colic. This lasted for some time, finally passing off. The subsequent history was that he had numerous attacks of the same kind, of varying severity.

In the spring of 1894 he suffered an attack which was much more severe than usual, since which time he had almost constant pain and was incapacitated for his work. Later in the spring he thought he detected an enlargement in the region of the gall-bladder. This became very tender.

June 1st he took to his bed. He was under the treatment of his partner in practice, and while in this condition one day he felt, as he described it, something "give way" suddenly, and he began vomiting large quantities of pus and bile, and actually vomited gallstones. This was followed by several large evacuations, in the course of ten or twelve hours, of the same fluid, and in the dejecta were numerous particles of gallstone débris, together with about one and one-half ounces of sand-like material. His own diagnosis (he is an extremely practical man) was proven by the operation to have been entirely correct—viz., that he had an overdistended gall-bladder which inflamed, adhered to the duodenum, and broke through into this part of the intestine. After this "giving way," as he called it, he suffered the most intense pain; there was loss of appetite, amounting almost to complete anorexia; there was constant pain, which confined him to his bed; he became emaciated, falling off to about 160 pounds. He contracted the morphine-habit in the meantime, and, during the late summer months, took six or seven grains daily when pain was most severe.

As I have said, his own diagnosis was absolutely correct, as was demonstrated by the operation—an obstructed gall-bladder with stones, adherent and fixed very high up toward the duodenum, and a fistulous communication with the same

—a natural cholecystenterostomy, but which, on account of the foreign matter back of it, failed to give relief. Jaundice was present more or less throughout the case from time to time, and evidently corresponded to the passage of some of the calculus débris by way of the common duct.

On opening the abdomen the first thing that came into view at the notch of the liver was a thick mass of adherent omentum. I incised this, and, gently pushing it out of the way, came down to the under surface of the edge of the liver, but could not locate the gall-bladder. A hard mass was finally detected high up beneath the diaphragm, and after a great deal of trouble I finally isolated the gall-bladder, which was a little larger than my thumb and impacted in numerous adhesions. A further separation of these adhesions brought into view the attachment to the duodenum, it being very high up, close to the point of entrance of the common duct—probably above that. The adhesions to the duodenum were perfectly firm. The question was, as I was working high up under the ribs, at least four inches from the point where I would have to make an attachment of the gall-bladder to the parietal peritoneum, whether I should carry out my original purpose—to establish a fistula to get rid of the débris and allow the communication between the gall-bladder and the duodenum to heal. After great difficulty I succeeded in getting the fundus of the gall-bladder down and stitched it to the highest part of the wound, which was nearly in the middle line, over what would normally correspond to the pylorus. I then scooped out a large number of small calculi and débris and placed a drainage-tube in the wound, packing around it with gauze, fearing that my sutures might give way, as there was much tension. He rallied nicely from the operation, and on the second day great quantities of this sand-like material came up through the drainage-tube. On the third day the dressing was saturated for the first time with bile. While relief from pain was not complete for the first few days, yet pain was much less marked, and by the sixth day he was quite comfortable. The wound has healed; his general health

is almost perfectly restored, and everything promises a complete recovery.

Certainly this case demonstrates that few of these cases are beyond painstaking surgical measures.

Case V.—A lady, aged thirty years, was seen in consultation. The history was that the patient had suffered with pain more or less continuous with paroxysms of great severity, for about a year. No jaundice, some emaciation; tumor the size of a fœtal head occupying the gall-bladder region. Diagnosis—overdistended gall-bladder from obstruction of the cystic duct.

Operation. The usual incision was made at the outer border of the right rectus muscle. The distended gall-bladder in this case was the largest that I have ever seen, being quite as large as a child's head. The contents of the gall-bladder consisted simply of normal mucus. The enormous weight had drawn it down on a line with the umbilicus. I incised the sac after drawing off part of the fluid, and, passing my finger down into it, could feel nothing at first. Passing my finger down to the junction of the cystic and common ducts without the gall-bladder in the peritoneum, I could feel a large calculus impacted at about the junction of the cystic with the common duct. On again putting my finger into the gall-bladder I could feel the stone, the folds of the duct intervening, but could not bring my finger in contact with it. After drawing up the gall-bladder and putting it quite on the stretch, I was barely able with the tip of my little finger to touch a small part of the surface of the stone, but could not move it. With the fingers of the left hand underneath and outside I could not impart any motion to it. I felt sure there was a constriction on either side of the calculus, that it was thoroughly impacted or encysted, as I was absolutely unable to move it at my first manipulation. I was fully fifteen minutes in getting the stone extracted, several times thinking that I would have to excise the duct from the outside and remove it in this way. Finally, however, the distal side of the duct was sufficiently dilated to force the calculus out. The specimen looked

much more like a urinary than a biliary calculus. It was very large and of a color that I have never seen before in a gallstone, being almost white and extremely hard. The gall-bladder was stitched in the usual way, and bile flowed freely through the fistulous opening in eight hours after the operation. This continued for six or eight hours, when it ceased, and has never returned up to the present time, the discharge from the fistula remaining being simply the mucus secretion of the gall-bladder. Adhesion of the stricture has probably taken place at the site of the stone which was encysted, thus cutting off communication between the common duct and the gall-bladder. If the little mucous fistula persists, I shall enlarge the wound and excise the gall-bladder, which in this case can be of no use to the patient.

CASE VI.—Man, aged forty years. Five years ago he was seized with severe pain, which was diagnosticated by the attending physician as being the passage of a gallstone. Since that time he has had repeated attacks of a similar character, attended with slight jaundice. Within the past year he has had no jaundice, but the paroxysms of pain have been much more frequent than formerly. I saw him November 7, 1894, when he was confined to his bed with severe and almost continuous pain in the region of the gall-bladder; temperature 101° F.; pulse 100; vomiting and loss of appetite. Examination revealed a large tumor below the margin of the ribs on the right side, very broad at its base and extending as low as the umbilicus. This tumor was quite tender. Diagnosis of overdistended gall-bladder, with inflammation, was made.

Operation November 9, 1894. The usual incision was made; omentum found adherent to the fundus of the gall-bladder, which was as low as a line drawn from the umbilicus; liver drawn down three inches below the border of the ribs, attenuated, and adherent to the anterior surface of the gall-bladder. Gall-bladder intensely congested and presented all the evidence of an acute engrafted upon a chronic inflammation. Aspiration revealed pus. After protection with sponges the patient was turned on his side, the gall-bladder was incised,

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and three ounces of pus, together with twenty-five medium-sized calculi, extracted. There seemed to be complete occlusion of the cystic duct, all stones occupying the cavity of the gall-bladder. After irrigation and drainage of the gall-bladder it was sutured in the usual way.

The patient has made an easy recovery, bile appearing in the wound the fifth day. The fistula has closed.

CASE VII.—Mrs. W., aged forty-four years, married. She has suffered for a year with periodic pain in the epigastric region, usually lasting less than an hour, occurring almost daily, but with no definite regularity and independent of any restrictions in diet. In fact, she had been treated for four months by the rest- and milk-treatment for indigestion. She is very nervous and tired of taking medicine for dyspepsia and gastralgia.

Operation February 13, 1896, an exploratory incision being made in the median line above the umbilicus. No abnormality of the stomach. The gall-bladder was found filled with small calculi. Cholecystostomy; recovery, with cure of gastralgia; fistula closed in three weeks.

CASE VIII.—Mr. H., policeman, aged thirty-seven years. He suffered for two years with periodic attacks of biliary colic, slight icterus and great itching of his skin accompanying each attack.

Operation April 2, 1896. Gall-bladder found distended with small calculi (1407). Cholecystostomy; uncomplicated recovery; fistula closed in four weeks.

CASE IX.—Mrs. B., aged thirty-two years, married, in good health until three years ago. Had repeated attacks of colic, attended with jaundice. Was treated for congestion of the liver. Eight months prior to the time I saw her she was seized with a very severe attack of colic, with rapid and profound jaundice, which has continued since, with emaciation.

Operation August 22, 1895. Gall-bladder small; no calculi in same or in cystic duct. Large, solitary stone felt imbedded in the common duct, near the duodenum; adhesions about the same numerous. After freeing the duct it was

incised and the calculus removed. The incision was sutured first by fine catgut, and over this a continuous Lembert suture of silk. It seemed secure. A drain of gauze was carried from the suture-point to the lower angle of the wound. Time of operation, fifty minutes. Reaction very good. On the second day after the operation the patient—a very self-willed woman—arose during the momentary absence of the nurse and crossed the room to where a pitcher of water had been left; she helped herself to this and returned to bed. The following night the dressing showed a bloody discharge of almost tarry consistency. The lower stitches were cut, and a large quantity of dark, clotted blood was removed from beneath the parietal peritoneum, but no definite point of bleeding was ascertained. Liberal drainage was made. The bloody oozing continued until death ensued from exhaustion at the end of the fourth day. No autopsy.

I assisted in two operations upon cases of common-duct obstruction, but without the marked cholæmia of long-standing which characterized this case. The same method of suture and gauze drainage were employed with perfect success. The operations were done by my office associate, Dr. James S. Chenoweth. It is significant that this unfortunate woman should have passed many stones and lose her life from arrest and common-duct impaction of the last one in her collection.

Case X.—Mrs. K., aged thirty years, married. History of many attacks of biliary colic during the past four years. Last attack very severe in character.

Operation February 7, 1896. Cholecystostomy; removal of twenty-six calculi of various sizes. Easy convalescence; fistula did not close until the end of six months.

Case XI.—Mrs. H., aged fifty-eight years. History of much pain and soreness in the right hypochondrium for the past five years; recently some fever; never had jaundice; marked tumor in the region of the gall-bladder.

Operation February 14, 1896. Gall-bladder contained a pint of pus and between sixty and seventy gallstones. Cholecystostomy; bile appeared on the second day through the

fistula; easy recovery; fistula closed five weeks after the operation.

CASE XII.—Mrs. S., aged thirty-three years; married. Tumor in region of the gall-bladder as large as a fœtal head; little pain; never had jaundice.

Operation May 25, 1896. Gall-bladder emptied of a quart of clear mucus and probably 400 calculi, mostly impacted in the cystic duct. Bile appeared through the fistula on the evening of the first day of operation; quick recovery; fistula closed in eighteen days.

CASE XIII.—The following case is, I believe, unique in the history of gallstone operations, hence I crave indulgence for reporting it a little more in detail. Mrs. R., aged thirty-nine years, presented for treatment in April, 1896. She was much emaciated and confined to her bed most of the time; she suffered great pain and tenderness in the region of the liver. She gave a history of pain in this region for several years, but present illness dates back four months, at which time she had a chill, followed by fever, which has been more or less continuous since. Examination revealed a large mass continuous with the liver, reaching as low as the umbilicus. Careful palpation led me to believe that the enlargement was the liver.

Exploration April 6, 1896. On opening the peritoneum the liver was found to be as low as the umbilicus, the abnormal position being by displacement rather than any increase in size. Attached to the inferior border of the right lobe of the liver across its entire length was the transverse colon. Beneath the liver was one inextricable mass bound in by omental, colonic, and duodenal adhesions. The mass was undoubtedly inflammatory, and from the history of the case I was satisfied contained pus. So great was the adhesion to the transverse colon that the liver was drawn down almost from beneath the ribs. The condition impressed me as probably being an abscess of the under surface of the liver. I did not think it wise to attempt a separation of the visceral adhesions, which would contaminate the cavity with pus in a situation impossible to satisfactorily drain. The superior (now

anterior) surface of the liver was free and in no way adherent to the parietal peritoneum. I thrust an aspirator needle through the lower border of the liver for a depth of three inches, and was rewarded by finding pus. The peritoneum was carefully packed with gauze around a space of liver surface two inches in diameter, the centre corresponding to the aspiration point. An incision one inch long was made into the liver and deepened until the abscess was opened by means of forceps. Six or eight ounces of pus were evacuated and the cavity of the abscess thoroughly washed through the opening in the liver. The soiled gauze was now removed and replaced by a coronet of fresh gauze and a large rubber drain carried to the bottom of the abscess-cavity. The upper part of the wound was closed by sutures. The patient did uninterruptedly well, the temperature falling almost immediately to the normal. The cut-off gauze was removed on the third day, and the abscess-cavity, which secreted surprisingly little, was irrigated daily. The seventh day after the operation, after removing the sutures, I concluded to replace the rubber tube with a small piece of gauze, as there seemed so little discharge. In carrying the gauze through the liver into the abscess-cavity my probe came into contact with a hard substance, the click of which was unmistakably that of a calculus. Believing the liver adhesion to the anterior wall from the gauze was firm, I had the patient etherized, enlarged the tract with my finger, and delivered with urinary-stone forceps an enormous solitary calculus nearly two inches in its longest diameter. The drainage-tube was replaced; bile appeared through the fistula four days later, the fistula closing the twenty-third day from the primary operation. The patient made a rapid and complete recovery.

This is the only case that I am aware of where a gallstone has been removed through the liver. Had I known the true condition at the primary operation it might not have terminated so favorably for my patient. Had this woman lived without operation I have every reason to believe that the stone would have been discharged into the colon.

Case XIV.—Lady, aged forty-seven years. History of many attacks of biliary colic with jaundice. There was some tumefaction over the region of the gall-bladder.

Operation November 6, 1896. Right kidney found displaced and adherent to the under surface of the gall-bladder. Thirty-six stones removed. Sixth day after the operation patient doing well.

DISCUSSION.

Dr. James McFadden Gaston, of Atlanta, Ga.—I agree with the essayist that in ordinary cases of gallstones in the gall-bladder, with obstruction of the cystic duct, the simplest procedure is to lay open the abdominal wall, attach the gall-bladder to the incision, and remove the gallstones; but in a large proportion of cases where there is complete obstruction I doubt whether there will be restoration of bile through the cystic duct into the gall-bladder.

We had a somewhat sweeping statement on the part of the essayist in regard to the comparative value of cholecystostomy and cholecystenterostomy. The two operations are applicable to entirely different conditions. No one would operate and expect benefit from a cholecystostomy except to establish drainage for the bile in a case of permanent occlusion of the common duct, and this is the only condition in which the advocates of cholecystenterostomy had ever alleged anything for it. A good many cases of occlusion of the cystic duct are unattended by obstruction of the ductus choledochus, and as a consequence there is no indication for any operative measure looking to the attachment of the gall-bladder to the intestinal canal, either in its upper or any other portion.

Dr. John D. S. Davis, of Birmingham, Ala.—I am very grateful to the essayist for this paper. It embraces many points that I would like to discuss if I had the time. There is one point I would especially emphasize, namely, that we frequently have cases of gallstones without the manifestation of symptoms, particularly jaundice, as illustrated by two of the cases reported.

In the second case there was no jaundice, while in the fourth one there were symptoms of colic, indigestion, dyspepsia, but with no typical symptoms whatever of gallstone.

Another point I desire to refer to and to discuss is cholecystostomy *versus* cholecystenterostomy: its advantages over that of cholecystenterostomy.

The ninth case reported by the essayist illustrates fairly well the advantage of drainage, because he evidently had, from his examination, discovered stenosis of the duct, and drainage overcame this. Here, I believe, as elsewhere in the body, particularly in urethral surgery, if we apply thorough drainage, the common duct will often open up and permit the flow of bile into the bowel. I do not believe it is generally best to resort to cholecystenterostomy as a primary procedure, but as a secondary one. We should first resort to drainage, and, if the stenosis is not relieved, if relaxation does not take place and the flow of bile is not established, then we may resort to cholecystenterostomy. While experimentation has not demonstrated it beyond a doubt, I believe it is a suggestion worthy of consideration, and that future practice will demonstrate the value of it.

Dr. George Ben Johnston, of Richmond, Va.—I was greatly interested in Dr. Cartledge's paper, and I congratulate him upon the brilliant successes he has met with in his operations. In the matter of diagnosis, I am convinced that if our examinations of the suspected cases or non-suspected cases were as careful and as thorough as they should be we would frequently find gallstones. The Doctor referred to the fact that in one case the gall-bladder was supposed to be degenerated or associated with movable kidney.

At the Charleston meeting of this Association I read a paper on the subject of movable kidney, in which I called attention to the fact that this danger could arise, and I cited a case in which a mistake had been made; also a case in which the two conditions existed in the same individual. It has been my experience that enlargement of the gall-bladder does not always occur where a stone exists, but that a condition which simulates enlargement of the gall-bladder frequently does exist, and it is due to the presence of numerous and dense adhesions to be found in the neighborhood of the gall-bladder, gluing it to every tissue with

which it comes in contact. This is particularly true of those cases which have existed for a considerable period of time and where the inflammatory condition of the gall-bladder has been excited either by the presence of stone or by infection. I have not met a single case where I have operated for the removal of gallstones in which the gall-bladder was not matted to all the neighboring tissues by numerous and, in many instances, very dense adhesions. One thing which has struck me as very singular and inexplicable in connection with the presence of gallstones is that the size of the stone or stones seems to make no difference in the production of symptoms.

The Doctor has presented some interesting specimens, and one of them I understand contains fourteen hundred and nine stones. Many of these are smaller than ordinary mustard-seed shot. We would naturally think that these stones could find an outlet through the natural passages, particularly when we occasionally see stones of considerable magnitude passing through the cystic duct and ultimately through the common duct and out into the duodenum. It is a little mysterious how stone or stones of such trivial dimensions could accumulate in the gall-bladder and not find their way out, lest, perchance, there is an inflammatory condition which brings about temporary stenosis of the duct, which is followed by the formation of stones, and these stones becoming corralled in the gall-bladder by the inflammatory condition cause temporary occlusion of the duct. If the stones formed previous to any such occlusion, it seems incredible they should not be discharged through the ordinary passages when we do see stones infinitely larger passing in this way.

In regard to the matter of hemorrhage of which the Doctor spoke, I think it is generally admitted that cases in which cholæmia is profound are the ones in which we are to expect hemorrhage.

The question of operating for stones in the gall-bladder is one which should interest us very much, because it gives such brilliant and satisfactory results. I agree with the essayist that cholecystostomy is the proper method of operating in all of these cases except where the obstruction is in the common bile-duct and cannot be removed. If the stone exists in the common bile-duct and the duct can be isolated from the adhesions which usually

envelope it, and the stone removed by a medium incision and the duct then sutured, of course, this is to be done; but we will encounter cases in which the obstruction cannot be removed, and in such instances the operation, by the Murphy button, of fixing the gall-bladder to the duodenum is a most admirable and advisable procedure.

In the matter of treating stones that are in the cystic duct or are free in the gall-bladder, the ideal operation is that of either fixing the gall-bladder into the wound or else removing the stones, suturing the walls of the gall-bladder, dropping the gall-bladder back into the abdomen, and closing the abdominal wound without making fixation between the gall-bladder and the abdominal wall. This would be applicable in such cases as are free from infection. If infection existed, it would not be a safe procedure. I have seen fistulæ following cholecystostomy at the end of ten months, but have never seen an instance in which the fistula did not ultimately close satisfactorily. The results of the operations upon the gall-bladder for the removal of stones are as brilliant and perhaps as satisfactory as any operations we perform, and I am firmly convinced that if we will search more diligently for stones in the gall-bladder we will find a great many more than we do. I desire to mention one single case. My cases have numbered seven, and up to this time I have not had a fatal one. One case, however, has been twice operated on for the removal of the gallstones. In the first case I removed five faceted stones. The patient made an uninterrupted recovery; the stones were not large and the symptoms were extremely severe. The paroxysms came on every alternate night with the utmost regularity, lasting for six or eight hours, but no stones ever passed. Finally, an operation for the removal of stones was undertaken, and five faceted stones as large as a cherry-stone were removed. Six months after the operation the woman's health was good, it having been entirely restored. She was again seized with symptoms identical with those which existed during the previous condition, and after a month or six weeks of suffering she again came back for operation. At the second operation I removed one stone not larger than the first, but without facets, which plainly indicated to me that that stone was formed after the first operation; that it was not one of the

group that belonged to the primary condition, but had formed subsequently. There was one thing in this case which greatly interested me, namely, that when the first operation was undertaken the entire gall-bladder was walled in by very dense and strong adhesions. These adhesions were broken up until the gall-bladder could be exposed and incised and stitched to the anterior abdominal wall. At the second operation there were no adhesions. The only adhesion was that which had been designedly made by the previous operation, but the surrounding tissues were remarkably free from any appearance of previous inflammation. There were practically no traces found during the secondary operation of the adhesions which had existed and were broken up at the first operation.

Dr. W. E. B. Davis, of Birmingham, Ala.—The surgery of the gall-bladder for stone, as has been stated, has given brilliant results, and I think we may safely say that the questions in regard to the surgery of the gall-bladder are about settled; in fact, we have gone but little beyond what was done by Marion Sims; but it is not so with the surgery of the ducts. There are questions in regard to operative procedures on the ducts that are not settled, and my remarks will be addressed to the case reported by Dr. Cartledge in which he operated on the common duct. I do not believe that he referred to cholecystostomy as being the choice of operation in a case where the obstruction of the common duct could not be removed. He must have had in mind the procedure advocated by Dr. Murphy, of cholecystenterostomy for stone in the gall-bladder where there is no obstruction in the duct. Murphy, for awhile, resorted to cholecystenterostomy in such cases instead of cholecystostomy. I do not believe the essayist intended to convey the idea that he would not do cholecystenterostomy where there is obstruction in the duct that cannot be removed.

To Dr. Gaston, more than to any other man in this country, are we indebted for advancement along this line. His experimental work is well-known to you and need not be referred to here.

I think the procedure recommended by Dr. Cartledge and resorted to in his case of stone in the common duct is unnecessary. Cases of cholæmia are bad ones to operate on. Fortunately, obstruction in the common duct is rare. In only a small per cent.

of the cases of gallstones is obstruction found in the common duct, perhaps in not more than 5 or 6 per cent. However, these are the cases that cause a great deal of trouble and give rise to a large mortality. Some of the cases in which the surgeon thinks that the patient has just passed the last stone are instances of movable stone in the common duct, as has been pointed out by Fenger, of Chicago. It will produce colic, bile will flow, and you feel that the patient has passed a stone. When you operate you find that the stone can be removed to all parts of the duct. As stated, operation in a case of obstruction of the common duct is very serious where there is marked jaundice, and the operation of stitching up the duct is a slow, tedious procedure—one that requires much time and greatly endangers the life of the patient.

Some years ago I made experiments to demonstrate that we could incise the duct and drain the bile with gauze without causing general peritonitis. I made these experiments to ascertain the effect it might have on operations for stone in the ducts. A paper on this subject was read by me in 1892 before the American Medical Association. Since that time I have still further experimented, and operations have been done by Dr. Gaston and others in which stitches were not used after the stone was removed from the duct; and while a number of these cases have died because they were nearly dead from cholæmia before the operation, yet in the cases in which this method has been used the abdominal cavity has been walled off, and peritonitis has not resulted from the operation. This operation can be done very quickly; it only requires a few minutes. You reach the duct, incise it on the finger, remove the stone, introduce a glass drainage-tube, pack gauze around it, and the operation is completed. In a large number of dogs on which I have operated in this way the results were good. It seems to me, if this is a safe procedure, it should be adopted in operating for stone in the common duct. Normal bile will cause peritonitis, and my experiments have shown that what would apply in cases of normal bile would apply in cases of gallstone. My experiments demonstrated, as has been shown by others, that normal bile may produce death from peritonitis in from thirty-six to forty-eight hours if there is no drainage. Sometimes it requires longer time. It acts as a chemical irritant.

Dr. George A. Baxter, of Chattanooga, Tenn.—I desire to emphasize two points that have already been brought out. One is the frequency with which these cases occur without the ordinary symptoms of pain or colic attending them. Only last week I had a post-mortem made for me in which there was extensive cancerous degeneration of most of the abdominal organs, involving the spleen and liver, the former of which was completely degenerated, the latter being extremely enlarged. Many of the abdominal glands were distinctly enlarged and movable, but the liver itself was carried very far down. The gall-bladder could be distinctly felt like one of the enlarged glands. An incomplete diagnosis was made at the time with reference to the gall-bladder, it being pushed down and mistaken for an enlarged gland. The complete absence of pain was puzzling. The post-mortem revealed the fact that there was an enlarged gall-bladder containing three large stones, associated with enlargement of other glands. In this case there was never a symptom of pain of any kind. We were greatly surprised when this condition was found, because we had been confused all along. Although the enlarged gall-bladder was detected, it was confused with an enlarged gland. Three times within the last eight years, in teaching surgery in the laboratory, I have come across gallstones myself in the gall-bladder, and from our dissecting-room have reports of several more, which leads me to believe that there are many more cases of gallstones existing than are detected during life, and that they frequently pass without recognition on account of the absence of symptoms of pain or colic.

Dr. F. W. McRae, of Atlanta, Ga.—I desire to report a case which I recently had which illustrates a phase of this disease that has not been mentioned. There was a history of repeated attacks of colic with profound cholæmia, decidedly more so than in any case I have seen from any cause, even cancer of the liver. An operation was undertaken with the belief that the obstruction was in the common duct and that there were gallstones in the gall-bladder. On opening the abdomen in the presence of Drs. Hardon, Cooper, Elkin, Kime, and Nicholson and a corps of assistants I found the liver very much enlarged and reaching almost to the umbilicus, but the gall-bladder was not enlarged. Instead of an enlarged gall-bladder I found a fibrous cord not larger

than my index-finger. The common duct was practically not occluded, but simply from disuse was reduced to a mere cord. There was, however, a distinct calculus in the hepatic duct, extending up into the transverse fissure of the liver. I knew nothing to do for a case like that, where the blood was profoundly poisoned and where the slightest attempt in breaking up adhesions caused an oozing of blood that was almost yellow in color; so I closed the abdomen, acting upon the advice of my colleagues, and my patient died about five days afterward, seemingly from exhaustion. I thought about the case a good deal. I know of nothing that can be done for cases of this character, and I report this case because I should like very much for Dr. Cartledge, in closing the discussion, or any other gentleman who may follow me, to give his experience along this line.

Dr. Cartledge (closing the discussion).—I have just a word or two to say in closing the discussion. I appreciate what Dr. Davis said in reference to Dr. Gaston as the man who has done so much to elucidate this subject—to deal with obstructions that cannot be overcome about the common duct by a cholecystenterostomy. I am very well aware that Dr. Gaston was the originator of this idea. The cases that I have reported, probably with one exception, have no bearing upon the question of the decision between the utility of cholecystenterostomy and cholecystostomy. The cases I have reported were those in which only a cholecystostomy would apply. I remarked parenthetically, in referring to outside cases, that it is a very serious question whether there are any cases of gallstones in the common duct that primarily demand a cholecystenterostomy. It seems to me it is questionable whether there is ever a condition of the gall-ducts that demands this operation as a primary procedure. This may seem heresy and a strange thing to say. I believe most of such cases should be primarily drained by cholecystostomy, and subsequently operate to open the common duct. I know one thing, that where we have pressure on the ducts from outside growths of an inoperable character or from malignant neoplasm of the ducts, the patients are going to die, and it is better not to jeopardize their lives with such a formidable procedure, but to simply resort to a cholecystostomy and drain in order to relieve them of cholæmia until they die. I recognize the merits and

ingenuity of the Murphy button, but I am not prepared to say that the Murphy button, as a means of anastomosis between the gall-bladder and duodenum, is good surgery. I am not prepared to say that the Murphy button is free from danger nor that cholecystenterostomy is devoid of danger. I believe when a patient is cholæmic it adds much to the danger, especially in inexperienced hands.

I wish I had read the report of the case I was going to mention where profound jaundice existed in a woman for many months. It was a patient of Dr. Davis's, who moved to our city. When I made a cholecystostomy she had a pulse anywhere from 150 to 160. She was profoundly jaundiced. I suspected absolute stenosis of the duct, but no stones could be found. All I did was to establish drainage to get rid of the cholæmia. She had a history of repeated attacks of gallstone colic, and it probably passed off during the diseased condition, leaving a stricture and stenosis. After performing a cholecystostomy the woman gained in weight, and ultimately the fistula closed. She is in a much better condition than if the cholecystenterostomy had been performed. I do not believe a chloecystenterostomy should be done in the class of cases I have reported. If the patient's condition is bad and you cannot at once operate for the relief of common duct obstruction, or if the case is inoperable on account of malignant disease, a cholecystostomy may be done and the bile drained, with the hope that the ducts will open up themselves. I think it is a safer procedure than cholecystenterostomy.

MENTAL COMPLICATIONS FOLLOWING SURGICAL OPERATIONS.

By John T. Wilson, M.D.,
Sherman, Texas.

The subject of mental disorders produced by or following surgical operations has not been discussed to any great extent, and until within the past few years only a passing notice was given it.

Dr. T. Gaillard Thomas reported six cases to the New York Academy of Medicine in April, 1889. He could find only twenty cases published previous to that date, and states that "prior to 1887 there was nothing in the way of literature on the subject." After Thomas called attention to this complication quite a number of cases were reported, but I find in my investigations in this field very few complete histories accompanying the report of cases. This important part of the subject has been much neglected, and therefore studies of the literature are somewhat disappointing. The various mental disorders of traumatic origin—if I may use this expression—are not so rare as may be supposed, and I presume every surgeon has met with cases during his career. They are sufficiently frequent to elicit a careful consideration and special study in order that they may be prevented or properly treated when they have developed. It is a strange fact that while surgical operations will sometimes cause serious mental disturbance, on the other hand these same operations will sometimes cure them—especially is this the case with some melancholiacs.

Many females laboring under attacks of melancholia caused by some disease of the genital apparatus have been cured when

relieved of the physical defect by operation; others have been much improved, and yet some have received no benefit.

The question may be very properly asked why a surgical operation should produce an attack of insanity. This can no more be answered in every case satisfactorily than can the question why some persons become insane from the many other causes to which it is attributed, for in most cases the segmental complications are a surprise, and no good reason can be given why they should follow; in others, however, a logical explanation might be had. If the patient is a high-strung, nervous individual, easily excited, unable to bear pain, the great and increasing dread of the anæsthetic, the operation, or both, will so affect him that he will lose control of the will power, and the explosion will come after the operation and reaction from the anæsthetic. In many of these cases —probably a majority—there is an hereditary taint or a strong neurotic tendency. The patient is generally very impressionable and emotional, and this is probably the reason why more females than males suffer, who are also more liable to hysterical attacks. I think it has been the observation generally that females are more subject to these mental outbreaks than males, not because they cannot endure pain with equal fortitude, but because they are generally nervous, more excitable, and emotional; are more susceptible to the extremes of mental emotion and to nervous explosions from operations upon the genitalia than other regions, and because a greater number of operations are performed on these organs than other parts of the body; but this sequel is by no means confined to operations upon the genital organs.

Polk has stated that he preferred not to operate upon cases that had previously shown an abnormal mental activity.

To anæsthesia has been ascribed the cause in some instances, but in those cases it is very likely that there is an insane temperament behind. Anæsthetics, too, may complicate the case, as they sometimes do by their effects upon various organs, which may combine with the other causes to produce a mental perturbation.

Any anæsthetic produces a more or less powerful depressing effect upon the heart. There are cases recorded in which albuminuria has been discovered after chloroform and other anæsthesia, specimens of urine not showing any previous to administration.

I have myself observed a hyperæmia of the liver and torpid condition of its function follow chloroform anæsthesia, with febrile excitement and mental exaltation.

Choloroform and ether produce more or less anæmia of the brain, or a venous stasis which may be very slow in being relieved; the patient may be feeble, and the delayed recovery from the effects may end in confusional insanity.

A very nervous person is liable to suffer from great dread of the operation, fearing that something dreadful is going to happen or that a fatal termination may result; resists the anæsthetic; may become wild and uncontrollable under the attempt to administer it; requires a greater quantity, is more difficult, and it takes longer for him to become anæsthetized, which has a more depressing effect; he remains for a greater length of time under its influence, and when he recovers from it labors under great prostration; the shock is more profound, and there may follow prolonged nausea and vomiting; he loses self-control, fears he cannot recover, and, becoming absorbed in these thoughts, dwelling upon them with such intensity in his already weakened nervous and physical condition, his mind gives way.

By this persistent dwelling on an approaching operation, its possible unfavorable results, and the fear of the anæsthetic, the dread is increased, the restlessness and nervousness become more and more manifest, appetite fails, digestion is interfered with, and excitement is intensified, the brain is in an anæmic condition, the physical powers are prostrate from the nervous tension; there is little wonder that in many such cases there should result confusional insanity, mania, or melancholia. From my researches on this subject I learn that it is very rare for the patient to recover from the anæsthesia with this mental disorder established or evident to the observer; but it

may come on suddenly or gradually within twenty-four hours, or several days or weeks may elapse before its complete development.

It is not always after a grave operation that these sequences occur. I have seen a violent outbreak in a patient from whom a small fatty tumor was removed; this patient, however, had had a previous attack of insanity.

There may be disease of some of the other organs, or their functions may be interfered with. The inebriate and persons long addicted to the drug habit do not bear operations well, as a rule, and these may be put down as predisposing causes of mental alienation. It is only in a few of most modern works on insanity that surgical operations are given as a cause of mental derangements, and then receive only a passing notice. Savage, of London, read a paper before the British Medical Association at its fifty-fifth annual meeting in which he states that "in persons who are predisposed to insanity, intoxication with mineral, vegetable, or organic poisons and the use of alcoholic or anæsthetic inhalations may be followed by acute delirious mania from which the patient may recover or may lapse into dementia or even to the progressive paralysis of the insane."[1] Dent attempts to show "that mental impressions may be produced in three ways: by anticipation, by actual operation, and by after-effects."[2] Mariet thinks (1) "that it is in those individuals who are predisposed by heredity or other grave causes—alcoholism, infectious diseases, etc. —that surgical operations give rise to insanity. (2) in the constituent elements of an operation that might act on the brain were two most important ones, namely, the anæsthetic and the degree of surgical traumatism with its after-effects, of which disturbed nutrition plays a very important part; (3) when predisposition also is considerable the anæsthetic alone may produce insanity, or it may result even after minor operations. It is, of course, necessary to take into consideration the mental state of the patient prior to the operation, especially

[1] Sajous's Annual, 1888, vol. 2. [2] Ibid, 1890, vol. 2.

in those graver ones where questions of life or death are frequently involved."[1]

Any great emotional strain may cause a mental disturbance or even complete loss of mental power. All diseases that have a tendency to exhaust or impair the nutrition of the nerve-centres weaken the mind, and it may not be able to withstand the great strain it may be called upon to sustain. Poorly-fed, badly-nourished subjects come under this head.

The antiseptic drugs used for dressing wounds have been accused of causing mental disturbance. Septic absorption is sometimes an accompaniment if not a cause. The mental derangement from septicæmia pure and simple can, however, be usually differentiated from others. The manifestations of mental disorders following surgical operations are not different from the same disorders produced by other causes. They occur in the form of confusional insanity, mania, and melancholia, which are the most usual, while very rarely we may have paranoia and dementia. We cannot classify the different manifestations of insanity by their pathological condition, but by their symptoms. Acute mania, melancholia, paranoia, confusional insanity, and even dementia may show but little or no structural changes. The pathology of insanity is yet in its infancy, and the mysteries of the dark ages still hang over it to a certain extent. Its classification is ever changing, never satisfactory, and its pathological conditions uncertain. In many cases these are functional insanities, and the only pathological conditions may be anæmia of the brain or in a few cases hyperæmia, tension of the cerebral arteries; the volume of blood being larger than can be carried off with sufficient rapidity may be improperly oxidized and become toxæmic; there may be a large quantity of serous fluid poured out, filling the cerebral ventricles and submeningeal spaces. This serous effusion I have thought has been the immediate cause of death in some cases by its pressure. There may in some cases be a rupture of a small vessel, or a thrombus may

[1] Sajous's Annual, 1890.

be formed. In many cases it is very doubtful if any pathological lesion of the brain can be discovered either macroscopically or microscopically, or there may exist a complicating organic disease, but which has not disturbed the mental equilibrium until after the excitement and shock of the operation have combined to produce the explosion.

In the majority of these cases there is a faulty nutrition of the nervous structure. Long suffering and exhausting diseases will have marked effect on the brain and nervous system, producing a decided weakness of the mental powers. The mind has a powerful influence over the functions of the organs of the body, which, in turn, when interfered with will react upon the brain and nervous centres. The outbreak may be sudden and begin with a wild delirium ; more frequently it comes on gradually, showing itself in a delusion that cannot be dissipated, followed by incoherent conversation, the patient becomes restless, troubled with insomnia and impatience, succeeded by violent excitement, passing beyond control except by absolute force, or there may be only fixed delusions and insomnia, which occur in nearly all cases, and often are the first symptoms to attract attention to an abnormal condition of mind, or the patient may become quiet, morose, refuse to speak or to notice his surroundings. There may be a moderate rise in temperature, or it may be subnormal, cold feet and hands, with slow pulse. In the violent forms there may be a higher temperature, increased pulse-rate, dry, coated tongue, loss of appetite, impaired digestion, and constipation, with more or less loss of physical power. Acute mania is generally accompanied in the beginning with febrile excitement. If the patient is violent and restless, laboring under great nervous tension, the functions are all more or less interfered with, the temperature is liable to rise with the excitement and fall with its subsidence. In most other forms we seldom have a rise in temperature or it may be subnormal. In septic poisoning or in any of the toxæmias we always have a greater or less degree of febrile movement. Sometimes, after a violent outbreak with continued excitement for several

days, signs of exhaustion appear, stupidity and coma gradually come on.

We cannot say that insanities of every class and degree are diseases *per se*, but symptoms of either disease or perverted function. The mind may be disturbed in some respects and remain so for a number of days, the patient having delusions, and yet not laboring under absolute insanity.

There can be no trouble about the diagnosis of a mental disturbance or an attack of genuine insanity after surgical operation; the manifestations are plain enough. We cannot always be so positive about the classification and the pathology. It is not difficult either, as a general thing, to distinguish insanity from the delirium of septicæmia, for while there are some cases of insanity that are probably the result of septic poison, they can generally be discriminated. The antecedent history is of value in these cases.

If there be no hereditary history of insanity, nor previous attack, nor organic disease, the subject robust, of good constitution, the prospect for recovery of both mental and physical health is fair; if, however, there is an hereditary or strong neurotic tendency, the patient in feeble health, the danger is great. It is well known that an emotional shock has frequently produced a permanent disorder of the intellectual faculties. Digestive disturbances, feeble pulse, a tendency to stupidity and coma, are always very grave symptoms. The cases of so-called confusional insanity of some modern writers, when there is no organic disease, no septic complication, recover after a time, when it is entirely functional and is not generally dangerous to life. Acute mania, if it does not exhaust the patient, is more favorable than melancholia; the former is rather more dangerous to life, the latter to a permanent impairment of mind. The percentage of recoveries from dementia is small. The danger to life from insanity after surgical operations is probably greater than from any other cause except malignant disease. My own experience, both from observation and study, limited to comparatively few cases, has taught me that the prognosis is not very favorable, as a

majority of the cases terminated in death or permanent mental alienation. Any mental disturbance coming on after a surgical operation in a patient who had not suffered from a previous attack, I should look upon with apprehension. Those systems which are poisoned by chronic alcoholism or other drugs do not seem to have the power of resistance that persons have who are free from the effects of this depressing influence. Upon the whole, I would say that the prognosis in cases of mental disturbance following surgical operations is nearly always fraught with great danger to life or permanent injury of the mind.

In view of the light we now have upon this subject, the knowledge gained from personal experience and the literature bearing upon it, it is the duty of the surgeon to have this unfortunate complication in mind whenever he decides to perform an operation, whether it be a minor or a major one. Cases of sufficient number are in evidence that prove the danger from the most trivial operation, and he should always be on his guard. "To be forewarned is to be forearmed." In obtaining the histories of our surgical cases, the antecedent mental and nervous peculiarities should be taken into account. We should be extremely careful and watchful of those patients upon whom we operate who have an hereditary tendency to insanity, or those who are unusually nervous, and who submit to an operation with great dread and even protest. Careful preparation should be given them, cheerful surroundings, reassuring conversations, nerve sedation, and plenty of sleep preceding the operation. Urgent operations cannot be delayed, but the patient can be placed in the best possible physical and mental condition in the short time given for preparation that the surrounding circumstances will admit of. There are some cases that from the very moment they come under the surgeon's observation, and he has decided upon his diagnosis, in which every moment's delay is a menace to life, and the very best must be made of the conditions as we find them. Do what we can to fortify the patient with hope and calm his fears; avoid making a

great display of instruments in his presence; of having too many in attendance or exaggerating in any way the preparation, all of which is better done quietly and out of his sight, the anæsthetic being administered in a separate room from where the operation is to be performed, when practicable. When there is no special hurry much can be accomplished by gaining the confidence of the patient, obtaining his free and full consent, even make him anxious for the operation, as can often be done; preparing his system, his mind, and relieving him of the great dread of the anæsthetic; impressing those with whom he is in constant contact—the family, the nurse, the friends—with the importance of cheerfulness in his presence, keeping his mind from dwelling upon the ordeal through which he must pass, or of encouraging him to look forward to it as the only means of deliverance from the condition for which it is proposed to be performed. Much can be done in this way, and by improving nutrition, increasing the powers of resistance to any complication that might arise. His surroundings should be kept quiet but cheerful and pleasant; visitors should be excluded, as their presence is decidedly detrimental. I believe by such previous careful preparation we will be able in many cases to ward off this most unfortunate complication.

DISCUSSION.

Dr. Ernest S. Lewis, of New Orleans, La.—If there is no one disposed to take the initiative in this discussion of the very interesting paper of Dr. Wilson, I will state that a number of observations of that kind have unfortunately fallen to my lot, both in abdominal and minor operations. One in particular was that of a woman, between thirty-five and forty years of age, very hysterical but manifesting no evidences of insanity, who was operated on for laceration of the perineum. During convalescence the hysterical manifestations increased and were associated with delusions, and her condition became so serious that she was unable to remain in the infirmary where the operation was performed. On different occasions she had threatened

to take her life. She was transferred to a private institution in New Orleans for the treatment of the insane, and after a thorough examination by the gentleman in charge of the institution an unfavorable prognosis was given. He told me that he did not believe she would ever perfectly recover her mind. In making inquiries into her family history it was ascertained that there had been similar cases among some of her relatives.

Another case I distinctly recall was that of an old woman, about sixty years of age, from whom I removed a very large, firmly adherent ovarian tumor. The operation was attended with considerable shock, but for a few days subsequently she did very well, and had no fever during her convalescence, but she became perfectly insane, and her insanity continued even after she was removed from the hotel. A very amusing feature of the case was that she charged her nurses and those in attendance and myself with having made away with all her money, and positively refused to pay for the services rendered both at the institution and to myself who operated on her; and this delusion continued even after she left the institution, so much so that on one occasion, when my collector went to present a bill, she kicked him out of the house.

These are the only two instances I vividly remember, although I have had cases of temporary insanity which passed off in the course of a few months.

Dr. William E. Parker, of New Orleans.—I had not intended to take part in this discussion, but I have seen two or three cases of insanity following operations in men, and in those cases I have not been able to trace any history of insanity in the family; but the men in whom the insanity developed were all alcoholics. Two or three of them either took cocaine or morphine. In the management of these cases, where the patient was addicted to any drug it was gradually cut off. If the patient was an alcoholic, I would give him some alcohol in addition to a general line of treatment, and in this way they were cured of their insanity. I think all of us have at times been impressed by the prostration which follows the cutting off of a habit of this kind that has gone on for a number of years. In the treatment of the insanity it is better to cut off these drugs gradually rather than suddenly.

Dr. R. B. Rhett, of Charleston, S. C.—I have had three cases of temporary mental aberration after abdominal operations, but none of any gravity. These three cases occurred very close to each other. All three were cases of removal of the breast for cancer. Two of the operations were done on old women, while one was a young woman who had suffered from puerperal insanity previously. In her case the insanity lasted about six weeks. She recovered. She was never violent, but very noisy, and had to be taken from the infirmary and transferred somewhere else where she could be taken care of. Her insanity subsequently recurred. In the other two cases the insanity in one lasted about three days and in the other about three weeks. One had hallucinations. In two of the cases there has been no return of the insanity.

Dr. A. M. Cartledge, of Louisville, Ky.—The discussion has brought out some important points as bearing upon the question of post-operative insanity, and it is an excellent idea to discriminate closely as to the probable etiology of many of these cases. I fancy that the author of the paper had in his mind to deal especially with post-operative insanity, supposed to be more or less functional in character, and due rather to the mental impression made by the operation in general. Yet I am quite sure that most cases, except those marked by some hereditary trait, can be traced to some organic lesion. If we will exclude the cases of direct contamination, as suggested by Dr. Parker, and the cases of surgery which involve the osseous system, especially as well as certain cases of direct intoxication which have been mistaken for post-operative insanity, we very materially reduce the class of cases in which the insanity is solely due to the operation *per se.* I think, in narrowing down these cases, the question of the history of the patient should always be one of the greatest importance. I have only encountered two cases of what I considered pure post-operative insanity. In one of these the patient had been in an insane asylum four years previous to operation. She had developed a pus-tube subsequent to that time, and seemed to be perfectly rational, but the operation pulled the trigger. It was a simple case. The pus-tube was enucleated without contamination, so that sepsis was clearly eliminated. She developed a violent acute mania on the third day after the operation, was

perfectly uncontrollable, and died. I looked upon this case as one of post-operative insanity.

The other case was one of removal of an ovarian cyst in a young maiden woman of about thirty-eight years, the case occurring within the past year. She has displayed a tendency toward delusions since, and certainly was very much unbalanced. She feared she was the victim of some serious trouble, and refused to meet her friends. At one time her greatest fear was that she had been pregnant. When we study the pronounced impression made upon the nervous system at the menopause, with the natural arrest of the process of menstruation, it is natural that we should expect the artificial production of insanity in those predisposed to it by heredity or otherwise. Most of the cases of so-called post-operative insanity that I have met in practice could be traced to organic or special pathologic changes, such as the reduction of habitual amount of alcohol, or to fat embolus.

Dr. John D. S. Davis, of Birmingham, Ala.—This subject is very interesting from a medico-legal standpoint. We are liable to have mania from any operation in any class of cases. No operation is absolutely free from the danger of this complication. I have seen four cases of insanity following operative procedures. In one case particularly, a young man, there was no history of insanity; but an analysis of the urine showed a great many casts and a slight trace of albumin before the operation. The operation was one of necessity, and was followed by acute mania, which lasted for seven days, then disappeared, and the patient finally recovered.

The point I want to impress is that we cite impressions of which we know very little, and I hope those who have given this subject considerable study will tell us more about it. One complication we encounter in many cases is renal trouble.

I would ask the essayist, in his closing remarks, to give us his opinion as to the responsibilities of the surgeon in this class of cases.

Dr. Joseph Taber Johnson, of Washington, D. C.—On the train last night Drs. Noble, Kelly, and myself were discussing this question. Dr. Noble referred to eight cases in his experience where insanity had followed operations on the perineum. I would like the essayist to state, in his closing remarks, whether

perineal operations are more frequently followed by insanity than other operative procedures. This point is interesting.

Dr. Wilson (closing the discussion).—It has been my fortune to observe quite a number of cases of various forms of insanity following surgical operations, and I do not think that they are more frequent in women from operations on the genitalia than from operative procedures on any other part of the body, except from the fact that there are more operations performed on these organs than on any other portion of the body. We know that diseases of the uterus and of the ovaries produce more hysterical attacks than from any other cause, and for that reason attacks of insanity have been ascribed more to operations upon the genitalia than any other part of the body. I remember one case distinctly of a woman who had a previous attack of insanity from whom I removed a small, fatty tumor about the size of my fist from the thigh. She did nicely for two or three days following the operation. There was union by first intention, but about four days after the operation she became violently insane. She seemed perfectly healthy, although she came from a neurotic family and had one attack of acute mania prior to the operation. This developed into a more marked mania, which lasted for eight months. She finally recovered. I have seen cases of insanity in men from trivial operations. For instance, I remember having a case of fracture of both bones of the leg. The fracture was treated and the patient apparently was doing well. It was thirty-six hours before the fracture was dressed, and during that time he suffered a great deal. His physical condition was not very good. There was lack of nutrition. He worried a great deal, and about the second week following the treatment of the fracture he developed melancholia, which lasted for three months, and he finally died. He passed into coma from a serous effusion.

Another case came under my observation not long since, the patient having been operated upon for appendicitis. The operation was well done, the wound had healed entirely, and there were no evidences of septic infection. The man did well for five or six days afterward. He finally had delusions and attempted suicide. The attempt at suicide was the first symptom that called attention of his physician and friends to the condition of

his mind. After that it was plain that he had mental aberration. He died a week after that.

In regard to the operation upon the perineum, I have seen two cases where the women became insane. One was a case of confusional insanity, the other one of acute mania. The insanity developed in both cases after the operation, and both died. These two women were very feeble when the operation was performed. They both had some uterine disease—some endometritis, probably—and the uterus was curetted at the same time the operation was performed. The wound healed nicely, no pus could be discovered anywhere, and neither of these women had any rise of temperature, but died of exhaustion from acute mania. I think perhaps women are more likely to become insane from operations on the ovary than upon the perineum, and my observations bear out this statement.

Dr. Gaston.—Dr. Battey removed the ovaries to cure insanity.

Dr. Wilson.—I know it. It does good in some cases, but does not result in a cure in every case. I had an interesting case last summer. A strong, hearty woman, of forty-five years of age, one of the victims of a cyclone, had a few bruises about the body and a simple fracture of the upper third of the humerus. The soft parts were lacerated nearly entirely around the bone, leaving, however, the larger vessels and nerves intact. The fracture was hastily dressed, because there were some eighty-six other patients who were wounded and had to be cared for. Very little attention was paid to the aseptic dressing of the wounds. We did not have an opportunity to do it, but did the best we could. The wound was dressed in this case with as much care as possible; she was put to bed and neglected for the next thirty-six hours. She reacted badly from the anæsthetic. She had nausea and vomiting for three days afterward. She had, at the same time, a severe diarrhœa, and on the third day she came under my care. I had a very excellent assistant who attended her with me. We quieted the stomach and also got the bowels in better condition. We gave her nutrition, opened the dressing in the arm, put up in plaster-of-Paris, but found no union, but suppuration had taken place. We cleaned out everything as best we could, but did not give her an anæsthetic at the time.

We got the wound in a fairly healthy condition and improved the nutrition of the patient as well as we could. We thought we had her in excellent condition, and after three weeks we concluded to operate on this wound; we wanted to save the arm, as she was a workingwoman and compelled to earn her living by her labor. She was a washerwoman. We concluded to save the arm by resecting the two ends of the bones and wiring them together and putting it up in plaster-of-Paris. We talked to her several days about it, and she vigorously opposed it until the last day, when some of her friends persuaded her to have it done, and she finally consented. We made preparations for the operation. It required very little chloroform to keep her thoroughly anæsthetized. We removed all the diseased tissue, sawed off the ends of the bones, drilled and brought them together with silver wire, and with silkworm-gut brought the soft parts together, dressed them as antiseptically as we could, and put on a plaster-of-Paris dressing. The woman did well for two days thereafter, when an acute mania rapidly developed and continued for ten days, then gradually coma came on, and she finally died in forty-eight hours thereafter. We removed the dressing and found the wound had healed nicely; callus was thrown out about the bone, and we all decided that she would have had a good arm if she had lived. We could not obtain a perfect history of insanity previously. And here is an important point in connection with this subject: Is it possible to obtain as good a history of these cases as can be had?

With reference to the drug-habit in these patients, no surgeon could think of operating upon a patient who was in the habit of taking morphine without keeping him under its influence and decreasing it little by little. If you take away morphine suddenly from a morphine habitué it will sometimes bring on mania. I, therefore, do not believe the morphine habit should be broken off suddenly. I think it is bad practice.

In regard to the question of Dr. Davis, I do not think a physician is any more responsible for insanity following operations than he is for a patient's death after operation. We sometimes operate on patients and they die when we do not think that they are going to die. A complication arises and they die. Some-

times the friends will hold us responsible and sue for malpractice. I never heard of a suit for malpractice being brought against a physician for a case of mental derangement following a surgical operation. I do not think the physician is any more responsible for insanity than he is for any other result following a surgical procedure.

SPLITTING THE CAPSULE FOR THE RELIEF OF NEPHRALGIA.

By George Ben Johnston, M.D.,
Richmond, Va.

Pain in the kidney usually denotes a gross lesion, the character of which is indicated by other manifestations.

Hydronephrosis, cystic disease, and impacted calculus are the least painful of the surgical diseases of the kidney. On the other hand, pyonephrosis, suppurative nephritis, perinephritis, perinephritic abscess, tubercular disease, tumors, and calculus in the pelvis commonly produce severe pain.

The presence of pain in a kidney aids in locating the site of the lesion.

A glance at the known distribution of the nervous supply of the kidney shows that the pelvis and capsule are sensitive, whereas the parenchyma is singularly insensitive, as evidenced by its ability to undergo complete destruction without pain, and the most trivial injury to or irritation of the pelvis or capsule will provoke violent pain.

We infer, therefore, that where pain is a pronounced symptom in any lesion of the kidney the pelvis or capsule is encroached on.

In any of the conditions I have mentioned, where pain is a symptom, there are other symptoms and physical signs concomitant with pain which usually enable the surgeon to determine the nature of the malady.

There are encountered, however, occasional cases in which pain is the most prominent symptom and where no physical signs or urinary changes exist to lead to a conjecture that organic changes are taking place in the kidney.

Collateral organs are frequently involved in this pain, such as the bladder, penis, and testicle.

Such cases simulate a condition involving a demonstrable lesion, such as renal calculus, vesical calculus, or the like.

Scrutinizing and repeated examinations fail to verify such an assumption, for the urinary changes and physical signs ordinarily associated with the suspected lesion are absent.

I know of no condition of the pelvis provoking sufficient pain to call for surgical investigation that would not afford abundant evidence of an inflammatory or mechanical injury competent to account for the existing pain.

Such is not true of pain arising from an irritation of the surface of the kidney or its capsule. Here violent pain may exist, with complete disassociation of all other evidences of kidney disease.

Medical literature contains many cases operated on for renal calculus where no stone was found, but where symptoms subsided after operation.

Here the pain which caused a simulation of calculus was due to some obscure and undemonstrable lesion, and was relieved by splitting the capsule in searching for the stone.

The capsule may have been contracted, the kidney tissue swollen and tense, or some other state existed which caused irritation of the sensory nerves of the capsule, producing the misleading pain without any actual structural change in the tissues themselves.

I am constrained to believe such cases are not altogether rare. I have seen two such, which are here appended, and I wish to cite three others, reported by Tiffany.

Two of these were embraced in a paper read by him before the American Surgical Association and published in its *Transactions* for 1889. The third, by Trimble, was personally communicated to Tiffany. They were incorporated by him in his paper on "The Surgery of the Kidney," read before the same society and published in its *Transactions* for 1894.

Extract from a clinical lecture delivered before the students

of the Medical College of Virginia in the Old Dominion Hospital, December 7, 1895. Reported by Dr. W. H. Lyne:

"The first case (Robert D.) I will show you to-day is referred to me by Dr. W. H. Barham, of Southampton county, Va. The patient comes with the diagnosis of probable stone in the kidney. He is a young man, twenty-six years of age, a farmer by occupation, and has resided all his life in Southampton county. He is, as you observe, slender and pale. His health has never been robust. At the age of ten he had a painful attack resembling renal colic, and another some two years later. Ten years ago he began to complain of pain in the right loin. This pain soon grew so severe and constant as to incapacitate him for his routine work. Besides this incessant pain he has had some paroxysms of excruciating pain apparently in the right kidney, extending down the ureter, which resembled renal colic. At these times there was some retraction of the testicle on the right side and very frequent urination. No stone was ever passed. He has likewise suffered pain in the bladder.

"If you had seen him on foot any time during his two weeks' sojourn in the hospital you would have observed his singular attitude while standing or walking. He always inclines the body forward and to the right, so as to relax muscular pressure on the kidney. When he lies down he flexes the thighs on the abdomen for the same purpose. It requires several minutes for him to rise from recumbency. All of his movements are characterized by the greatest deliberation and slowness, and all look to protection of his right kidney.

"Palpation reveals the right kidney slightly enlarged, somewhat firmer than its mate, and exceedingly tender. He shrinks when bimanual pressure is made on it.

"Up to this point his history is identical with nephrolithiasis. Careful and repeated examinations of the urine alone furnish a peg on which to hang a doubt. In cases of stone in the kidney the urine presents the following characteristics: There is nearly always some hæmaturia. When blood is passed the amount is not usually large, but is gen-

erally constant and is increased by exercise. The blood is intimately mixed with the urine, and gives to it a smoky-brown color. The urine is highly acid and usually diminished in quantity. Pus is always present, but may be very small in quantity, due to simple irritation. If infection of the kidney occurs, the amount of pus is greatly increased. Epithelia from the pelvis can be made out by microscopical examination. Crystals of the salts that are in excess, and which probably compose the calculus, are usually present. Occasionally portions of the calculus are passed.

"None of these conditions of the urine were ever present in this case. The urine has been absolutely normal throughout. Thus we are forced to the belief that no stone exists; that if one is present it is imbedded in the substance of the kidney and not free in the pelvis. I regard it as a case of nephralgia simulating stone. Nevertheless an exploratory operation is demanded.

"I place him in the best position to facilitate exposure of the kidney by incision. His face is turned downward, the Edebohls cushion is put under his dependent side, and the ilio-costal space of the affected side is thus elongated. An incision is made along the outer border of the erector-spinæ muscle, commencing just below the last rib and carried to near the crest of the ilium and deepened until the perirenal fat is reached. This is torn through and the kidney is exposed. A few sweeps of the finger are made around the kidney to free it sufficiently to permit its partial delivery through the wound. Inspection shows the kidney somewhat enlarged and the capsule mottled. Palpation reveals a firm, tense, and unyielding condition of the organ; but nowhere is there a hard mass such as would be produced by stone. The thumb and finger compress the pelvis between them, and nothing except the pelvis and upper portion of the ureter separate them. No foreign body can be felt. The ureter for a short distance is also palpated, and is likewise free. To make the search complete I take a slender, sharp, round needle and pass it into the kidney at many points, so that if a stone is present

I will detect it when the point of the needle impinges on it. Nowhere do I find a stone, but from every puncture the blood spurts up freely and to a considerable height. This diligent and thorough search does away with the idea of stone, and confirms the diagnosis of nephralgia.

"If I had found a stone I should have opened the kidney and extracted it. As it is, I look upon the symptoms in this case as arising from a too tight capsule, and hence I shall split the capsule from one end of the kidney to the other and go a little way into the kidney substance. This done, you observe how the cut margins widely part and the kidney tissue bulges into the gap. I will place a rubber drain in the wound, close it with deep sutures of silkworm-gut, and dress it with iodoform-gauze.

"This man will soon be out of bed, even if his symptoms are not cured, for the operation I have done is not a dangerous one."

The hospital records show D. to have made an easy and regular recovery from the operation. It is noted herein that pain began to diminish almost immediately, and when he was discharged, January 7, 1896, he had been absolutely free from pain for more than two weeks, and was otherwise much improved. A letter received from Dr. Barham in the early part of October, 1896, in answer to my inquiries about D., says: "D. is entirely well. He has had no pain since his return from the hospital, has gained more than twenty pounds in weight, and has worked every day during the season in the harvest field."

Dr. George Ben Johnston's case (Tiffany's paper): J. S., of Irish birth, sixty-five years of age, carpenter by trade, consulted me in September, 1891. In early life he followed the sea. Had yellow fever in 1850, in Colon, C. A. Ten years ago he was operated on for piles by ligature, and cured. He had had no other serious sickness, and was temperate in his habits. For some weeks he had suffered pain in the right loin. The pain was variable in intensity, but always present, sometimes exceedingly severe. Associated with it were gas-

tric disturbances, irritability of the bladder, and now and then the retraction of the right testicle. Frequently the pain followed the course of the ureter, and was occasionally felt in the glans penis. There was tenderness on pressure over the kidney. Posture: Assuming an attitude which would relax the muscles of the right loin brought some relief. There was some vesical irritation, enough to justify the sounding of the bladder, with negative result. The desire to pass water was quite pointed. No blood or pus in the urine. Frequent and painstaking examinations of the urine were made both by me and Mr. Hugh Blair. These examinations, to a certain extent, bore out the opinion I had formed in the case—namely, that I had to deal with a renal calculus. When I became convinced of this, nephrolithotomy was determined on.

The operation was made November 25, 1891. It was conducted under the usual antiseptic precautions. The incision by which the kidney was exposed was a V-shaped cut, with its apex upward. On exposure the kidney appeared larger and firmer than I have usually seen. Palpation revealed nothing. Numerous punctures with a needle failed to detect the presence of a stone. Through each of the little wounds made with the needle a smart little geyser of brilliant blood welled high up, and the punctures continued to bleed freely. Being convinced now that I had proceeded on an erroneous diagnosis, and recalling reported cases of "capsule splitting" for painful kidney, I resolved to practise this procedure here. Consequently a free split was made in the capsule the whole length of the kidney. This wound gaped widely, and the kidney tissue bulged far out. Immediately the bleeding from the needle punctures ceased. The flesh and skin wounds were carefully closed, leaving a small drainage-tube.

On the evening of the day I operated, after the effects of the anæsthetic had entirely passed off, the patient expressed himself as much relieved. His recovery from the operation was wholly satisfactory. The symptoms simulating calculus disappeared. The pain promptly abated and never returned,

and with its disappearance the other distressing symptoms likewise subsided.

Dr. I. Ridge Trimble's case (Tiffany's paper): E. N., white, male, aged twenty-eight years, farm laborer, suffered greatly from pain in the region of the left kidney. Blood in the urine was occasionally seen, and pus. The urine was acid and contained oxalate of lime crystals. There was frequency in passing water, much tenesmus accompanying the act. No urethral stricture existed, and examination of the bladder by sound elicted no information. Suffering continued for eighteen months, and the patient lost flesh.

February 19, 1894, the kidney was freely opened and explored; nothing was found. The operation-wound was promptly healed. Pain did not return, neither did the other symptoms referred to the bladder. The man is entirely well and able to do day labor. . . . .

Bladder symptoms are mentioned prominently in the two preceding cases, and disappeared with the kidney incision. This reflected pain and relief after nephrotomy are evident in the following history:

A. H., male, colored, aged thirty years, came under my care April, 1893, suffering with general tuberculosis. He urinated very often, with much pain and straining; urine acid, containing red blood- and pus-corpuscles. He was much emaciated. Failing to give relief to the bladder symptoms by medicines, I opened the bladder above the pubes and introduced a tube; the urine drained freely away, but the tenesmus and cystic pain continued, notwithstanding the presence of the tube, which was adjusted so as not to press against the interior of the bladder. Suprapubic drainage giving no relief, I opened the kidney through the loin, and at once the bladder symptoms disappeared. The man lived a number of weeks, dying of tuberculosis. A post-mortem examination was not allowed.

Dr. L. McL. Tiffany's case: Mrs. F., married, white, aged forty-nine years, having a grandchild aged thirteen years, consulted me December, 1888, in regard to severe pain in

the right loin. She had had sexual relations with many men, had had gonorrhœa and syphilis, and had had an abscess within the pelvis, which opened into the vagina, and discharged pus continuously during a period of two years, healing some years since.

She was apparently in good health. Three years ago, being then well, she experienced pain in the right loin, which began suddenly and without warning, was very intense, and passed away quickly; it was supposed to be due to the passage of a kidney stone along the ureter. Up to the time of seeing me the attacks of pain had occurred at irregular intervals, the periods between the attacks becoming progressively shorter and the paroxysms more severe, until the woman was willing to obtain relief by any sacrifice or at any risk. Treatment of all kinds had failed to benefit the patient permanently, and morphine hypodermically during an attack of pain was relied upon; while in the interval between two attacks morphine granules were had recourse to occasionally. No calculi had ever been voided, blood had been seen in the urine at rare intervals, the bladder was occasionally a little irritable; bowels regular, appetite good; sleep was stated to be irregular, but probably not more so than the habits of the patient justified. An attack of pain began suddenly, always in the right loin, being referred to a point midway between the pelvis and ribs; thence the pain extended to the middle line of the body and down to the bladder and groin on the right side; exertion was apt to induce an attack; pressure over the right kidney produced pain, but no tumors could be made out; vomiting had accompanied a paroxysm of pain on one or two occasions. Urine faintly acid; specific gravity, 1022, contained pus-cells and a few red blood-disks. No elevation of temperature during an attack of pain was noticed. Free division of the capsule seemed to be indicated.

January 12, 1889, I exposed the kidney by the usual incision in the loin and found it moving freely with respiration, the perirenal tissue being healthy. A deep stellate scar existed

in the anterior and outer border of the kidney about two inches from the lower end. This scar was stiff and hard. Handling discovered no other abnormality. A long needle was passed through the scar and also into the kidney in various directions, but gave no information. A fine puncture was then made into the kidney pelvis at the lower end, a small sound entered, and each calyx systematically explored as well as the pelvis (Jordan Lloyd's method); nothing was learned by this exploration. The capsule of the kidney was then freely split for a distance of three inches or more, the incision passing by the side of the deep scar referred to. The edges of the cut capsule gaped widely, which I considered evidence that tension had existed. The wound was closed and antiseptic dressing applied. During the first twenty-four hours bloody urine was passed, after which the urine appeared clear. No urine passed by the lumbar wound. During the second night the patient displaced the dressing, which was found at my morning visit between her shoulders, the wound being in contact with the bedclothing. Fortunately, the deeper portion of the wound had healed, so a little surface suppuration only took place, which, however, caused discomfort. Three weeks after the operation pain in the loin was complained of, and the patient feared lest the old attacks might again set in. This fear proved groundless, for, though some pain was experienced in the loin after the wound had healed, yet the pain constantly diminished in intensity, and the patient returned to her regular habit of life, took exercise, attended to her housekeeping, and went to the country in the spring.

Conclusions. 1. Nephralgia is not always associated with a demonstrable lesion.

2. When other evidences of kidney disease are wanting the pain is perhaps due to a too tight capsule.

3. Nephralgia may and frequently does simulate symptoms of gross tissue changes or mechanical irritants.

4. Where severe and persistent pain in the kidney exists without other evidences of renal disease exploratory operation is indicated.

5. When inspection, palpation, and needle-puncture fail to disclose a condition sufficient to account for the pain, the capsule should be freely opened.

DISCUSSION.

Dr. J. Wesley Bovée, of Washington, D. C.—The operation described by Dr. Johnston of splitting the capsule for nephralgia gives us a new idea of treatment of those cases in which there is no demonstrable lesion, unless it be constriction of the kidney tissue within the capsule. One interesting point is, What is the nature of the condition on the inside of the capsule that causes such compression? There are other points aside from this.

The term nephralgia, as the essayist says, is one that is very vague. There is very little meaning to it. It is a term applied to conditions of the kidney when we find nothing else to account for the pain. We simply call it nephralgia.

I think we are indebted to Dr. Johnston for the points he has brought out in his paper. The localization of pain in the kidney is usually due to some morbid condition, and when we cannot find any morbid condition he has given us a way out of the trouble. If by splitting the capsule of the kidney we can relieve these obscure cases of nephralgia, a distinct advance has been made.

Dr. John D. S. Davis, of Birmingham, Ala.—I am very grateful to Dr. Johnston for bringing these cases before the Association. I have had no experience in splitting the capsule for nephralgia. Very few of us have; but I expect we shall be searching for these cases in the future. I have a case under my care at present of neuralgia of the back. The patient has considerable pain in the right side, and although we are not able to detect anything in the urine by microscopical examination, yet the patient suffers pain continuously. After hearing Dr. Johnston's paper I have come to the conclusion that it is a case of neuralgia of the kidney. If the patient does not get better, I shall try and find out.

Dr. Johnston (closing the discussion).—I regret very much the discussion has not been more abundant. I had hoped that many of the gentlemen would speak on this subject. One point

I wish to speak of, namely, the pain which we describe as nephralgia and which is relievable by the splitting of the capsule. I would ask Dr. Davis whether the pain in his case is unilateral?

Dr. Davis.—The pain is on one side.

Dr. Johnston.—It might be a case of nephralgia, and in case the pain was on both sides it might mean almost anything else than nephralgia.

URETERO-URETERAL ANASTOMOSIS; A CASE.

By J. Wesley Bovée, M.D.,
Washington, D. C.

I trust I may be pardoned for bringing this subject to the attention of the Society, after the able and carefully prepared contributions to the surgery of the ureters by Van Hook, Fenger, Kelly, and Cabot in this country, and the classical works of Glantenay, Liaudet,[31] Tuffier,[52] and others in Europe.

It is, however, not an old subject, and, thanks to the pioneer work of Pawlik and Kelly, we are rapidly brushing away the clouds from the pathology and treatment of diseases of the upper urinary tract.

These organs are so intimately associated with the female generative organs, both in position and function, that the interest of the gynecologist must be drawn to their abnormal conditions. The work of the specialist cannot be limited to the reproductive organs. The rectum and bladder have already claimed his attention, and the ureters and kidneys are also applicants for the same honor.

In this direction a great field for study is presented, and I believe it is the gynecologist that is destined to enlighten the profession on the diseases and treatment of these organs. Kelly, Pawlik, Fenger, Kuster, Van Hook, and others have started us in the right direction, and we will rapidly increase our knowledge of the yet unknown functions and pathology of the ureters and kidneys.

Definition. Our conception of uretero-ureteral anastomosis is the approximation of adjacent portions of the ureter so as to remove the interruption of its function, due to partial or complete section of this organ by accident or otherwise.

This meaning does not contemplate such cases as have been reported by Kuster,[23] Mynter,[33] and Fenger,[14] in which they have done such excellent work on the portion of the duct adjoining the pelvis of the kidney. While the kidney pelvis is of the same anatomical construction and function, yet it has not the same shape and size as the ureter, and therefore surgical treatment of it is more easily executed, and without the danger of stricture or fistula remaining. Nor do we allude to such vaginal work as has been done by Emmet,[13] Parvin,[35] and others; or, even, to the lowest two inches of the organ as a rule, for it would probably be too difficult to be carried out, transperitoneally, in this portion. Besides, the vesical graft is probably more advantageous here, notwithstanding the difficulty of making a proper duct-ending by that operation. Nor can it be applied when a considerable extent of the duct is destroyed. It is scarcely necessary to state that uretero-ureteral anastomosis does not comprise the implantation of this organ into the vagina, rectum, ileum, or even to the surface of the body.

Kelly has given to this operation the name "uretero-ureterostomy," a term of whose propriety we do not feel confident. Yet, as no critical objections to it are apparent, its use would seem to be warranted by its convenience.

So far as we could learn from the Library of the Surgeon-General's office, the operation has been very rarely attempted on man, and never previous to Schopf's case,[44] in 1886. We have found recorded eleven cases, and wish to place on record one that occurred in our own experience. We are obliged to think that many more cases have been reported, but not under titles indicating them, thus rendering them nearly inaccessible. For instance, Cushing's[9] case was found by reading a report by him of "Rare Forms of Myomectomy," in one case of which he was obliged to repair, in this manner, a cut ureter. Probably many have occurred, both successful and otherwise, that have not been reported. So that it will be seen that this extremely important part of ureteral work has been neglected. This is readily apparent when we remember the great work

done by Pawlik, Kelly, and others in the treatment of constrictions, inflammations, and calculi in this duct. Perhaps more striking would it appear if we call attention to the many kidneys that have been sacrificed for injuries to this tube.

ANATOMY. In order to better understand the matter under consideration, it will be well to refer briefly to the anatomy, anatomical relations, and physiology of the ureters.

The ureters are two small elastic tubes that convey the urine from the kidneys to the bladder. They are continuations of the pelves of the kidneys down to the bladder, and have a diameter of 3 to 4 mm., with a lumen about equal to that of a "goose-quill." Their length is given by different authors to be from 10 to 16 inches. Sappey, as quoted by Glantenay[17] (p. 16), says 10 to 12 inches; Henle[19], 11 to 13 inches; Tanquary,[49] according to Van Hook,[21] says 10 to 12 and never more than 15 inches; while Quain[41] puts them 14 to 16 inches. This diversity of opinion upon what would seem to be so easily determined is probably due to the contractility of the ureteral walls and to measurements being applied to this organ within the body by some and by others after its removal. The structure of the canal is as follows: An external fibrous coat, a middle coat of plain muscular tissue, and a mucous lining. Cabot[7] says bands from the fibrous coat intimately connect it with the peritoneum thoughout its whole extent, and Glantenay and other authors hold to the same opinion. According to Huschke and Obersteiner (Quain) the muscular coat possesses two layers of longitudinal fibres and a middle circular layer. Henle finds only an inner longitudinal and an outer circular layer, while Kolliker, who admits the inner longitudinal and circular as the principal layers, describes longitudinal fibres external to the circular layer which are absent at the upper part of the tube (Quain). Wendt[53] gives the following description of the lining. "The mucous membrane, thin and smooth, presents a few longitudinal folds when the ureter is laid open. It is prolonged above to the papillæ of the kidney, and below becomes continuous with the lining membrane of the bladder. It is stratified, consisting of at

least three layers of cells, variously shaped and large. The most superficial layer consists of flat or polyhedral cells of various sizes, each one containing a round or oval nucleus, or, as frequently happens, two nuclei. Then comes a layer of conical or club-shaped bodies, each one again furnished with a round or oval nucleus. Every cell also possesses a long basal process, which appears to attach it to subjacent tissue. The bulbous portion of these corpuscles is turned outward in the direction of the surface. Wedged in between the processes just mentioned we find the third variety of cellular elements. These are oval or rounded bodies containing ellipsoid nuclei."

The lymphatics are well developed here, forming several networks in the different layers of the ducts, and the blood is supplied from small branches of the renal, the spermatic, the internal iliac, and the inferior vesical arteries. The veins end in various neighboring vessels.

The ureter has three points of diminution of calibre; first, at 1½ to 2 inches from the pelvis of the kidney; second, at the junction of the pelvic and vesical portions; and a third, when present (found in three out of five cases), where it crosses the iliac artery. These should be particularly remembered in dealing with constrictions of this duct.

The course of the ureter is as follows: At first it passes obliquely downward and inward to enter the cavity of the true pelvis, having in this portion of its course a slight convexity toward its fellow of the opposite side. The pelvic portion, less than one-half of the duct, is more strongly curved, almost the arc of a circle, with its convexity directed toward the lateral wall of the pelvis, until it finally reaches the neck of the bladder (Fenger[14]), the wall of which, according to Bell,[3] it penetrates so obliquely that it runs from ½ to ¾ inch between the muscular and mucous coats before finally opening into that viscus. Its shape then is much like that of the letter S reversed. Tourneur[51] says, "The course of the abdominal portion of the ureter in the false pelvis corresponds to a vertical line erected upon a point at the junction of the internal and middle thirds of Poupart's ligament. We con-

sider it directly vertical from the border of the kidney down to the small pelvis, over the brim of which it passes, 4½ cm. from the median line. The exact location of this point is the intersection of a horizontal line drawn between the anterior superior iliac spines and a vertical line passing through the pubic spine." Bell (p. 173) says, "It will be observed that the orifices of the ureters are not closed by the contraction of the muscular fibres around them. They are defended against the return of the urine by the obliquity of their passage through the coats of the bladder. It is well known that the extremity enters through the coats of the bladder obliquely, and in consequence of this there is a valvular action in the coats of the bladder which prevents the regurgitation of the urine into the duct of the kidney." Again, on page 176, he states: "On dissecting up the inner coat of the bladder there are seen two strong fleshy columns which, descending from the orifices of the ureters toward the orifice of the bladder, unite and run toward the prostate gland. On the surface, toward the cavity of the bladder, they are denser by the union of the inner coat of the bladder; but they are fibrous, and this fibrous structure is made manifest by dissecting from below. They are larger and firmer, but are of the same color and structure with the fleshy columns of the *detrusor urinæ.* The variety which we find in their length, according with the degree of contraction of the bladder, proves their muscularity. Whatever excites the action of the bladder increases the size of these muscles in a remarkable degree, and they always acquire a great deal of power and size when the muscular coat of the bladder becomes more distinct and powerful. In some of my specimens of diseased bladder I find this to be caused by stone in the bladder; in others, an ulcer; in many, stricture; but irritation and the necessity of continual action of the bladder are always attended with an enlargement of the muscles of the ureters." The influence of these so-called "muscles of the ureters" over the orifices of these canals is explained as follows by him: "If we consider the subject, we shall find that in proportion as the bladder contracts this

obliquity must be diminished, and further, if we reflect that the coat which contracts is on the outside of the oblique passage of the ureter, we shall conclude that without some counteracting power on the inside of the bladder to draw down the orifice of the ureter, the obliquity of the passage would be lost. These muscles, which I have now described, guard the orifices of the ureters by preserving the obliquity of the passage and by pulling down the extremities of the ureters according to the degree of contraction of the bladder generally." This remarkable study was published in 1812. A corresponding musculature exists in the female bladder and has the same function. Gorley,[13] of New York, mentions these muscles and cites their excited action in certain bladder affections.

Anatomical Relations. Of the anatomical relations of these ducts Quain says (p. 417): "In its whole course it lies close behind the peritoneum, and is connected to neighboring parts by loose areolar tissue. Superiorly, it rests upon the psoas muscle, and is crossed, very obliquely from within outward, below the middle of the psoas, by the spermatic vessels which descend in front of it. The right ureter is close to the inferior vena cava. Lower down the ureter passes over the common or the external iliac vessels, behind the termination of the ileum on the right side and the sigmoid flexure of the colon on the left. Descending into the pelvis it enters the fold of peritoneum forming the corresponding posterior false ligament of the bladder, and, reaching the side of that organ near the base, runs downward and forward in contact with it, below the obliterated hypogastric artery, and is crossed upon its inner side, in the male, by the vas deferens, which passes down between the ureter and bladder. In the female the ureters run along the sides of the cervix uteri and upper part of the vagina before reaching the bladder."

Kelly,[24] who has perhaps done more than anyone else to familiarize us with the ureter, calls our attention very distinctly to the relations of this organ to the ovarian artery and vein which cross it about the middle of the abdominal por-

tion and accompany it to the pelvis along its outer side. At the point where it dips down into the pelvis, especially on the right side, it is just behind the peritoneum, and can often be felt even through the abdominal walls. However, on the left side at this level it is very apt to be either behind the sigmoid flexure or its bloodvessels. It is again crossed in front by the ovarian vessels, and still nearer the bladder the uterine artery crosses inward above it. It passes completely under the broad ligament and along the anterior vaginal wall to the bladder. It can be very easily felt in the roof of the vagina in nearly all cases.

PHYSIOLOGY. The function of the ureter is to convey the urine from the secreting organ—the kidney—to the reservoir —the bladder; and in doing so it is important that it be so arranged that there will be no regurgitation of urine. The arrangement described by Bell is sufficient for that purpose. Glantenay (p. 47) says: "At the junction of the ureter with the bladder the mucous membranes of these two organs form a circular fold that acts as a valve for the prevention of regurgitation of urine." This matter is of great importance in the after-treatment of uretero-ureteral anastomosis. The urine is conveyed to the bladder along this canal by two forces, usually, the one being absent when the subject assumes the horizontal position, and the other constant. They are the force of gravity and the peristaltic movement of the duct. The former would be very readily understood from the position of the ureter, and the latter has been repeatedly noticed by physiologists as well as by abdominal surgeons. Smith,[48] during the removal of a very large abdominal tumor, had a most excellent opportunity to observe this action of the ureter. He saw the peristaltic action of this organ occur every four to six seconds in both ureters. Landois and Stirling[29] (p. 649) say that, according to the observations of Mulder, this motion passes along the whole length of the duct at the rate of 20 to 30 mm. per second.

The following cases of uretero-ureteral anastomosis are all we have been able to find in the literature of the subject, and

they are arranged in as nearly chronological order as is possible, some operations being not dated. For the translations from the German we are pleased to acknowledge our indebtedness to Dr. R. H. von Ezdorf, of this city.

CASE I. Franz Schopf[44], *Cyst of broad ligament; ovariotomy; injury to the ureter.*—S. F., aged thirty-nine years; never pregnant; had a tumor occupying abdomen, filling pelvis, and very slightly movable. June 2, 1886, laparotomy, puncture of cyst, containing thin yellow fluid, pus-cells, fat and cholesterine crystals; abdomen has very little serous fluid —one litre. Cyst adherent to ligament latum, uterus, and pelvic wall; bladder was freed from cyst; the adhesions were so thick that they were tied off and cut with the thermo-cautery; the right ureter was cut in separating these adhesions, and the two ends of it temporarily caught with forceps. The rest of the cyst was then removed with the use of Billroth's clamp. The ligamentous attachment was tied off in five portions and removed with the thermo-cautery. Attachments to the uterus were treated in the same manner; ends of ureters then considered; they were deeply buried in fibrous tissue, so that the ends could not be carried to the abdominal wound. It was therefore decided to sew the divided ends together, after proving they were patulous by the passage of a sound. They were dissected for a short distance free from the surrounding tissue, yet considerable remained on them. The ends were now freshened and approximated by eight silk sutures passed through all but the inner coat; no urine leaked, and the toilet of the peritoneum was completed; abdomen closed; operation lasted three hours; catheterized every four hours. June 10th. Has passed urine spontaneously—two litres per day. June 15th. Burning sensation in passing urine, which is opaque and contains heavy sediment; bladder washed out with carbolic solution. June 30th. Patient has had diarrhœa, cough, and rapid loss of flesh. July 21st, seven weeks after operation, died.

Autopsy. Both apices of lungs surrounded by fibrous tissue; in left upper lobe several small abscesses; other parts of lung

very anæmic; spleen decaying; right kidney size of hen's egg; parenchyma contracted; pelvis of kidney distended; left kidney, amyloid degeneration; right ureter, at crossing point of psoas, imbedded in connective tissue, itself like a linear cicatrix, with a fine, non-absorbable silk thread; in bladder, opaque urine and few phosphatic concretions on its walls.

Case II. K. Pawlik.[36]—I. K. M., aged twenty-seven years, multipara, noticed enlargement of abdomen in fall of 1886 that has rapidly increased since March, 1887; small skeleton, poorly nourished and cachectic; abdomen barrel-shaped—ascites; tumor extending across pelvis, supposed to be malignant; lower extremities œdematous; twenty litres dark brown fluid removed by tapping. November 4, 1887, exploratory laparotomy; pelvis found filled, tumor on right side, few cysts, and near it papillomatous growth. Ascitic fluid drained by incision; thought to be a malignant growth; abdomen closed; discharged, cured of wound, December 3, 1887.

July 6, 1888, paracentesis, removing twenty-one litres bloody serum; discharged six days later. March 12, 1889, patient feels generally improved. Removal of tumor was undertaken March 28, 1889, by abdominal incision; fourteen litres dirty yellow fluid containing cholesterine crystals escaped; peritoneum thickened; intraligamentous tumors; colpeurynter introduced into rectum, cut peritoneal surface on left side; tissue beneath appeared as œdematous; shelled out the tumor mass from below; attachments to the uterus tied and cut free; also tied outer side in region of inferior pelvic ligament; anterior surface of growth free, showing it to be attached to posterior layer of broad ligament. Right side: thick adhesion to rectum, tied off and cut, freeing a peritoneal cyst; treated same as other side; thus freeing iliac vessels and a number of veins. This tumor was also adherent to posterior layer of broad ligament, but thicker and more strongly attached to peritoneum, bladder, and bottom of Douglas's cul-de-sac. After removing the tumor, began removing the papilloma in Douglas's space. This was difficult, as the growth was deep in the

cul-de-sac and the colpeurynter raised it but little; carefully freed the mass; as it was so near the ureters, a small portion of the adhesions had to be cut with scissors; in the peritoneal gap was a strand running from front posteriorly like a blood-vessel, with an opening that involved one-half the cut end of the strand, from which no blood escaped; recognized as a ureter, and passed an elastic ureteral catheter into the bladder, drew it forward with forceps, passed the other end of it in the kidney and sewed the ureter ends over it with silk suture (Lembert) in two courses. After closing ureter closed peritoneum over it; also in other places where peritoneum was torn; closed abdominal wound; compression bandage; left ureter catheter in place; vesical tenesmus; bloody urine from catheter; catheter slipped out on account of patient's restlessness; died fourteen hours after operation.

Autopsy. Abdomen contained a small amount of sanguinolent fluid; chronic peritonitis, perihepatitis and perisplenitis; new fibrinous inflammation of intestinal serous membrane; the sutured ureter was patulous, and the sutures did not allow any fluid to pass even by injections under very strong pressure.

CASES III. and IV. William Tauffer.[50].—1. Enucleation of right intraligamentous cyst; loosening and cutting of ureter. Placed in both ends of ureter a piece of English catheter, No. 8, tied in its middle; used six to eight sutures; removed catheter before tying last three knots; drainage, vaginal and glass, abdominal. Cured. 2. Enucleation left extra-peritoneal tumor; bleeding; in excision and tying off parts of tumor capsule near the uterus a tumor, bluish, transparent, one inch thick, thought to be a hematoma, was incised and found to be a ureter which he had cut off. Sutured as first case. Cured.

CASE V. Heinrich Fritsch[16], on pages 264 and 265 of his work, reports a case as follows.—"In operating for a tumor I once cut the ureter, and did not know whether I was dealing with that organ or a large vein. I passed a uterine sound into the bladder and a ureteral sound into the lower part of the cut ureter; both sounds came into direct contact in the

bladder, demonstrating that it was the ureter. With fine intestinal sutures the ends were brought together and healed perfectly."

CASE VI. Julius Hochenegg[20].—Z. A., aged forty-eight years, cancer of body of uterus, with infiltration of left parametrium, small vagina. February 9, 1890, sacro-peritoneal extirpation, during which resection of left ureter and bladder was necessary. Ureter was sutured end-to-end and bladder sutured. On the twentieth day fatal hemorrhage from the granulating wound occurred.

Autopsy. Ureter and bladder sutures intact; origin of hemorrhage could not be located even by autopsy.

CASE VII. Kelly, H. A.[25].—During hystero-myomectomy, May 1, 1892, for the removal of a large tumor, he mistook the large ureter (hydro) for a large vein, and, after ligating, cut it in two. Did uretero-ureteral anastomosis by ligating lower end close to cut surface, making a longitudinal slit 1 cm. long in its anterior wall, ½ cm. below ligature; invaginating upper end into lower portion, and suturing the edges of the slit to the intussuscepted portion; iodoform gauze drainage; patient passed urine on second day voluntarily; union by first intention; recovery

CASE VIII.—E. W. Cushing[9] reports a case of removal of a large soft myoma that had lifted up the ureters so that one of them was cut during the operation. The ends of the cut ureter were found and united by two fine silk sutures and one of catgut. There was a discharge of a little urine from the wound for some two weeks, but the fistula promptly closed. Both ureters were distended and tortuous; recovery. Patient well two years later (vide Emmet, 12a).

CASE IX. B. Emmet[12]a.—On November 22, 1894, while removing from a woman, aged twenty-five years, a large solid mass attached over the fifth lumbar vertebra (œdematous fibroid, 10 by 12 inches, pronounced by the pathologist of the hospital to have been at one time attached to the uterus), I chanced to sever the left ureter at that level. Anastomosed by Van Hook method, using three sutures instead of one as

suggested by the orginator, as the upper portion was very much distended and had to be puckered to get it into the lower portion. Then continuous suturing of edges of slit to upper segment. No drainage; catheter left in bladder six days; recovery.

CASE X. Doherty[12], of Georgia, quoted by Van Hook, sent to the latter the report of a case like Kelly's, in which he accidentally cut the ureter across during a laparotomy, and immediately closed the injured duct by the Van Hook method. The patient recovered without an untoward symptom.

CASE XI. A. W. Mayo Robson[42] says: "In removing a large myoma uteri which weighed twenty-five pounds, and which had raised the peritoneum from the floor of the pelvis, I found I had taken two inches out of the ureter. Instead of performing nephrectomy or establishing a ureteral fistula, I anastomosed the proximal into the distal end by splitting the lower end and drawing the upper into the lower; recovery was uninterrupted, and the amount of urine was never diminished. Patient remains well six months after.

CASE XII. Author's.—Mrs. D., white, aged thirty-eight years, married, was referred to me during the summer of 1895, by Dr. G. N. Perry, of this city, for treatment of a much relaxed vaginal outlet. This was present as well as a prolapsed uterus, the cervix of which protruded from the vulva; she bore evidence of the overwork that she said was necessary to the support of her child and her invalid husband. No disease of the appendages was present. At this time she accidentally received a blow in the right flank from a stone thrown by a boy.

Surgical relief was advised for the pelvic condition. I did not see her again until April last, when, at the request of Dr. Perry, she was admitted to my service at Columbia Hospital for the proposed surgery.

She then told me she had suffered continually from pain at the seat of injury mentioned above. Upon examination I was amazed to find the uterus fixed high to the left and front;

that the right side of the pelvis was filled by an inflammatory exudate yielding a sense of fluctuation, and that a smaller mass was to the left and behind the uterus. Abdominal section was decided upon and done April 30, 1896.

A right tubo-ovarian abscess with a thick pedicle was found, and in ligating the ovarian vessels near the right side of the pelvic wall the ureter, lying in a dense mass of exudate, was unintentionally included in the ligature. The abscess-mass was grasped on the outer end by a strong forceps, and the tissues between the ligature and this instrument divided with scissors. A vessel with a calibre larger than we would expect to find in such conditions was found to have been severed in this procedure, the cut end showing in the end of the pedicle. The other cut end of the vessel was found, and, thinking the ureter had been severed, a uterine sound was gently passed along it to the bladder. Now, being certain of the nature of the duct, we dissected this portion of it from the abscess-wall and bed of exudate, and proceeded with the operation, taking advantage of this amount of time to decide upon the manner of treating the ureteral complication. This abscess was removed without rupture, as was a large left pyosalpinx; the left ovary, though cystic, was left after being resected. It was decided to do an end-to-end anastomosis, by converting the transverse wound into an oblique one, with some loss of extent of the duct. This seemed necessary, as the lower end had been grasped too tightly by forceps and the upper end by ligature, tightly applied, both ends being damaged thereby. The side of the lower end grasped by the forceps was trimmed off with scissors quite obliquely, and, after placing a gauze plaque about the upper portion of the duct, the ligature was removed and the ovarian vessels ligated. A very small amount of urine escaped from the cut ureter, confirming the diagnosis of cut ureter, and the sound was now passed upward to the kidney to interrogate the condition of the duct. This, though done very gently, brought two or three drops of blood. Both kidneys were now palpated and

thought to be larger than normal; nevertheless, as no other evidence of kidney or ureteral disease was found on the injured side, we proceeded to close the ureteral wound. The upper portion of the duct was cut off obliquely just above the place that had been constricted by the ligature and fitted to the lower stump already prepared for the union. The cut ends of the duct were dilated with forceps for an inch and approximated with No. 1 silk, such as is used in intestinal work, as follows: with a small, round, straight needle a rectangular suture was inserted and tied, not very tightly; two interrupted ones followed, and this process of alternating was continued until the whole circumference of the duct had been sutured; the rectangular sutures were applied as in the liver or in some friable tissue. Great care was necessary to procure an even and exact approximation of the surfaces without puckering, and this was done satisfactorily by the alternation of the two kinds of sutures. Over these sutures were inserted a few—probably four or five—interrupted ones that reached a little farther up and down the duct; no suture penetrated the mucous membrane of the ureter. The peritoneum was carefully brought over the injured portion of the duct and sutured so as to wall off the ureter from the peritoneal cavity; the toilet was carefully made and the abdominal wall completely closed with buried kangaroo-tendon in three tiers; bladder catheterization was practised every six hours, as necessary, for the two following days.

May 15*th.* Has made an uninterrupted recovery; no suppuration has occurred in the abdominal wall, and a very indistinct line of incision remains; patient left the hospital about June 1st.

September 17*th.* Complains of pain in left side of pelvis; since operation has menstruated regularly four times, once profusely, while on a railroad journey; three ounces of urine were drawn off by catheter and submitted to an analyst, whose report is as follows: specific gravity, 1016; reaction, acid; albumin, none; color, pale straw.

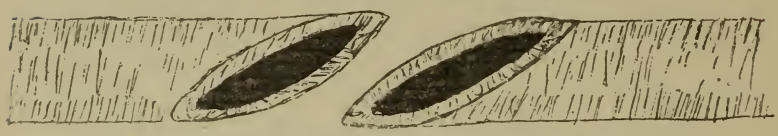
Microscopical: a few epithelial cells, amorphous urates,

phosphates; no pus, no casts from the kidney. "Note epithelial cells, probably from bladder."

An examination of the pelvic contents reveals a slightly enlarged uterus; a soft, freely movable mass two inches in diameter (probably a cyst of the remaining ovary) to the left of the uterus and slightly attached to it; some slight thickening felt, but little tenderness noticed to the right of the uterus.

From September 17th to October 15th the urine was measured and varied in daily quantity from forty-one to ninety ounces. She has periods of diminished excretion, accompanied with pain, that are followed by free discharge and sudden relief of suffering; is very nervous and has severe family and financial troubles. These latter probably cause

FIG. 1.



Shows obliquity of cut ends of ureter preparatory to oblique end-to-end anastomosis.

FIG. 2.

Oblique end-to-end anastomosis with sutures tied.

the variable urinary excretion. In the latter part of October a careful examination was made of the pelvic and abdominal organs to ascertain as nearly as possible their state, and, especially, to learn if any ureteral or renal changes could be found. The result was negative, except the small mass to the left of the uterus already alluded to, and that seemed unchanged

since the previous examination (September 17th); after some difficulty a ureteral sound was passed freely into the right ureter, and no constriction seemed present.

Figs. 1 and 2 explain the method of trimming the ends of the cut ureter and of applying the sutures, as well as the appearance of the duct after suturing by the oblique end-to-end anastomosis.

When this operation was done we were not aware of any former one nor of any like suggestion having been made for such cases. We had known of cases of cut ureter in which bladder anastomosis, rectal grafting, and even nephrectomy had been done; and we had heard of some in which the ureteral injury had been learned only by autopsy. This was the first time an injury to a ureter had knowingly been a complication of any of the author's abdominal operations.

Since that time we have found in the literature of the subject mention made of the twelve cases herein cited, of which one died in a few hours after an unusually severe operation (Pawlik); another on the twentieth day from secondary hemorrhage (Hochenegg); and a third (Schopf) at the end of seven weeks from tuberculosis. In short, not one died from any ureteral complication. Of the twelve cases reported, 25 per cent. died; seven were done in Europe and five in this country. Of the five in this country, all were saved, and of the seven done abroad but four recovered. The amount of shortening of the duct from resection was, in Robson's case, two inches, and in the author's fully one inch. In Kelly's, Emmet's, and Doherty's an inch shortening probably occurred. As Van Hook has said, these ducts are very elastic, and can be stretched considerably if necessary. Not much is to be learned from the published cases regarding the best method and suture-material for this operation, as the description in case-reports is very meagre. Schopf merely mentions using eight fine sutures that did not penetrate the mucosa; Pawlik, two courses of silk, Lembert stitch; Tauffer silk, Lembert stitch; Fritsch says "fine intestinal suture," and Cushing "two fine silk and one catgut." The author

believes that the rectangular suture with the interrupted is safest, and that fine silk is safer than catgut, as it knots more firmly, not so long ends must be left, and it occupies less space in the ureteral wall. Drainage is mentioned in but four cases (those of Kelly, Tauffer, and Cushing), and in but one—Cushing's—was there any leakage reported.

The operation of itself is not an easy one. In nearly all cases the duct cannot be brought up to the abdominal wound for repair, and therefore it has to be done deep in the pelvis or in a higher portion of the course of the duct. If we have been dealing with a large accumulation of pus in the pelvic cavity, or, as in many of the cases reported, with large abdominal and pelvic tumors, we have probably severely taxed the recuperative powers of the patient and are anxious to close the wound and get her in bed. Then, too, our fingers are tired, and we do not feel like attempting a task so delicate as this one is when properly done. Is it, then, surprising that some alternative which can be more easily done is resorted to instead? While the normal urine is not injurious to the peritoneum, yet it is advisable to prevent its coming in contact with it if possible. We cannot be certain that it is not infected, as will be the case if a suppurating focus from stone or other cause be present higher in the canal. It is well, therefore, to apply forceps to the upper end of the injured duct or gauze between it and the peritoneum until after the suturing is finished. If the pressure-forceps be lightly applied, the injury to the ureteral wall will be slight and quickly repaired by the wonderfully good blood-supply with which this organ is endowed. Should we be so unfortunate as to come in contact with pus in the operation it will be necessary to establish drainage, otherwise its use is scarcely demanded. I do not wish to be understood as ignoring the presence of ureteral abnormalities above or below the point of suturing, but to particularly guard against temporary infection from them. It is advisable to explore the duct for these conditions before closing the wound in its wall. It is not in the purpose of this paper to discuss the various lesions already

mentioned that call for this operation, as nearly always it will be supplementary to other surgical procedures, and its success depends upon the care, skill, and anatomical knowledge of the surgeon. Before entering into the consideration of the various methods of restoring the passage of the duct it will be well to mention some of the experimental work in this line that has been done on dogs.

Weller Van Hook[21], of Chicago, devised and practised on a dog as follows: "January 17, 1893. Bitch, medium sized, in good condition. Assisted by Dr. A. E. Halstead, I opened the abdomen in the median line through an extent of two and one-half inches, beginning at a point one inch above the pubes. Gentle traction upon the bladder caused the ureters to stand out prominently beneath the posterior layer of the peritoneum. Opening the posterior peritoneal wall with a snip of the scissors, the right ureter was drawn gently out and cut in two with the scissors at a point about an inch above the entrance into the bladder. The open end of the lower fragment was next closed with a ligature and a slit about 7 mm. long made in the side of the tube just below the ligature. Two needles, armed with a single thread of catgut, were then passed through the wall of the upper portion of the duct from within outward, opposite the slit in its wall which had been made to enlarge the opening. These needles were then passed through the slit in the side of the lower portion of the ureter and their points carried down the tube about 1 cm., where they were pushed through the wall of the ureter and brought out side by side. By gentle manipulation the upper extremity was drawn into the lower tube, and the suture, being tightened and tied, the slit was seen to be entirely occluded. Dogs have a very abundant omentum, and to simplify the technique the omentum was gently drawn about the ureter and tacked down by two fine silk sutures. The abdomen was closed. Three weeks later the dog, which had not been ill after recovering from the anæsthetic, was killed. Abdominal wound was completely healed. Upon opening the abdominal cavity much fat was found in the

usual places, showing good nutrition. The kidneys were perfectly normal and exactly equal in size and similar in appearance. There was no excess of urine in either pelvis. There was absolutely no evidence of inflammation at any point. The union of the ureter was found to be perfect."

According to Glantenay, page 221, Poggi, of Italy, in 1887, tried anastomosis of the ureters in two dogs by invaginating the upper segment into the lower and suturing them in place. The results were eminently successful. In one dog this was carried out in both ureters. Both dogs recovered without leakage about the site of operation, though the lumbar wound had been closed completely. One dog was killed at the end of fifteen days and the other in three and one-half months. The continuity of the ducts had been entirely re-established without the slightest restriction. Tuffier was not so successful, due to the tendency of the upper end to slip out of the lower as soon as peristaltic action was established, and to obliteration of the duct in other cases. Budinger,[36] assistant to the clinic of Billroth, made several experiments, following the method of Poggi, with very bad results. Much fault may be found with the procedure of both these latter workers. They tied the ducts before operation and untied them afterward, thus injuring them and encouraging both restrictions and fistulæ. The failure was in part due also to the small size of the ureter in the dog. Bloodgood[25] performed the operation on a large dog, following Van Hook's method, killed the animal at the end of two and one-half months, and found no restriction of the calibre of the ureter.

Methods. From the above it will be noticed that efforts to unite the ends of the ureter have been done by four methods, viz.: (1) lateral implantation by the method of Van Hook—a very ingenious procedure, and which has been done by two experimenters and on man by three operators, all in this country and all successful; (2) by transverse end-to-end approximation, practised on the living seven times probably with good results; (3) by oblique end-to-end anastomosis—only one case, the author's, which was successful;

and (4) the end-*in*-end method, as applied in experimentation on dogs with varying success by foreign experimenters and in one case on man—Robson's, which was also successful. Of the Van Hook method we make but one criticism. The sutures pass through the mucous membrane of the upper end in two places, and between these places is in the lumen of the duct.

In our judgment this offers an opportunity for the urine to percolate through the wall of the tube along the sutures. Of the transverse end-to-end method the results have been very good. Schopf's patient probably died of tuberculosis, and had a contracted or atrophied kidney and dilated pelvis on the side of the injured ureter. As the duct had been in a mass of dense fibrous tissue previously, and as all adhesions, even the ureter itself, had been severed by the thermo-cautery, it is not surprising that the autopsy showed this condition with other changes. In Pawlik's case death occurred too early to demonstrate anything beyond the complete closure of the wound in the ureteral wall. This point was demonstrated beyond any doubt. Tauffer's two cases are reported as "successful" without any description of the meaning of that term.

Hochenegg's case died of secondary hemorrhage from the wound of sacral hysterectomy on the twentieth day, and the autopsy showed perfect healing of the ureter, nothing more being recorded bearing on the amount of constriction. Fritsch merely says his case healed perfectly, and that is all that can be gotten from the brief report of the case of Cushing. In this last case, however, perhaps due to incomplete suturing, there was a leakage for two weeks. The end-*in*-end plan, as followed by Robson, we cannot indorse without reserve. The failure of some experimenters leads us to look upon it with suspicion. We must not forget, however, the successes of Poggi and Robson and the difficulty of dealing with this duct in the animals experimented on, due to its small size, as attested by Van Hook, himself a bitter opponent of this method. We look forward to better results from experi-

mentation by this plan. Of the oblique method perhaps we should speak with reserve, as it is the only plan that has been followed by us, and the case herein mentioned is the only reported application of it to man or the lower animals. By it, however, the objections to all plans other than Van Hook's are obviated. The line of union is much longer than in the transverse union, the ends do not separate, as is their tendency in the invaginated method of Poggi, and the constriction cannot well be of moment. We believe it as worthy of merit as Van Hook's plan. Certainly no suture penetrates the mucosa, as in his method—a fact that would seem to us of no little importance, especially if permanent suture-material be employed in the procedure. The literature of the subject of ureteral calculi is not free from case-reports of calculi formed with ureteral sutures as a nucleus.

The *alternatives* for this operation may be divided into two principal classes, viz.: those having in view the *restitutio ad integrum* of the ureter, and those planned for the complete extinction of the urinary function of the affected side. In the first variety may be classed implantation into the bladder, rectum, ascending or descending colon, small intestine, and its grafting on to the skin. In the second class we may place nephrectomy and simple ligation of the ureter, as is done to produce atrophy of the kidney, with complete loss of its function.

The bladder graft is probably the best alternative we have for uretero-ureteral anastomosis. Though not so good an operation, it is applicable to wounds of this duct too extensive for the approximation of the cut ends of the ureter. It has been successfully practised by Krug,[27] Penrose,[37] Kelly, and many others after the method suggested by Van Hook, and by Novaro[34] and others using the Paoli-Busachi method.

The plan suggested by Van Hook of making a canal of part of the wall of the bladder, outside the peritoneum, when necessary to meet a short portion of the renal end of the ureter, is a brilliant project and worthy of trial. He even suggests the downward transplantation of the junction of the peritoneum

to the bladder when necessary to get a still longer bladder-flap. It allows for a very great loss of ureteral structure, and if it proves successful we will have little to desire further in the restorative surgery of this duct. All these cases, and very many others, have been done by the intraperitoneal method, and we have been able to find but one case performed extraperitoneally (Baumm[2]). The extraperitoneal route, however, is much inferior to the vaginal or the intraperitoneal way. Implantation into the rectum of one or both ureters was first suggested by Roux and put into practice by John Simon in a case of exstrophy of the bladder, with an unfavorable result. Chaput has done it twice successfully, and Leet,[30] of Scranton, Pa., has performed it with like result. Reed, Zeller, Van Hook, and others have experimented on animals, reaching different conclusions. Van Hook has concluded that the danger of infection is so great that it is an unjustifiable procedure. Boari,[4] an enthusiast on this subject, resents the statements of its opponents regarding this danger of kidney-infection, and in the paper in which he describes his buttons for this anastomsis, says: "Quant a moi, je suis convaincer que le courant de l'humeur secréteé par une organe, *quand elle a un libre cours*, est capable de maintenir intact le canal excreteur et de le defendre des agents infectants qui pourraient s'y introduire du dehors." He further says that the gradual trickling of the urine prevents infection. These and other statements made by him: that the uterus has an opening on the surface; that a child mentioned by Duplay and Reclus lived seventeen years, voiding all urine by the anus, and that recto-vesical and vesico-vaginal fistulæ exist indefinitely, without infection, are of no value, and we are inclined to think with Van Hook that great danger of infection of the kidney is always present in cases of ureteral implantation into the rectum, as well as into the colon or small intestine. It is probably the absence of the valve-like mechanism that normally exists at the vesical end of the ureter that allows such facility to infection of the urinary tract. The power with which some duct-lining cells seem

to be endowed—that of defending the organs, to which they act as carriers, from infection—is not given to the otherwise potent cells that line the ureter. Here nature has placed three organs of defense, viz.: the muscle that guards against incontinence ordinarily, the sphincter vesicæ; the mechanism described by Bell, previously mentioned, and the mucous fold at the ureteral orifice, together with the obliqueness of the debouchure of the ureter into the bladder. It is easily understood that in nearly all cases of ureteral grafting the two later defenses are destroyed, the only exception being when a portion of a bladder-wall surrounding the duct orifice is transplanted with the duct. This is done in some cases of grafting into the rectum. Even then the musculature of Bell is not retained. Experimenters have attempted to form a valve at this point to obviate the danger of future infection.

Practically the same arguments hold against grafting the duct into the alimentary canal at other points. There yet remains one class of cases, however, in which this mode of disposition of the excretion of urine is the only one. I allude to cases of incurable bladder disease, particularly when malignant or tubercular, in which it is necessary to remove that organ. In such cases we can sometimes save the ureteral orifice and implant it into the rectum on one or both sides. The difficult feature with grafts into the bladder, as well as those into the bowel, is to secure anastomosis that will take the place of the natural one that exists at the termination of the ureter in the bladder. Boari thinks the sphincter of paramount importance. There seems, on the one hand, to be danger of too great constriction, producing an impediment to the passage of the urine and a consequent hydronephrosis, and, on the other, a too large opening with free regurgitation of the urine, especially when the bladder is allowed to become even slightly distended, with the same evil result. In these bladder anastomoses we also have the danger of regurgitation whenever contractions of that organ occur. There will be less resistance in the direction of the graft than by the sphincter vesicæ. A. James[27] has demonstrated that a head of water

of 2.4 feet causes sufficient pressure on the tubules of the kidney to completely suppress the function of the organ. That this condition may easily result from backing up of urine in the ureter and the pelvis of the kidney is readily understood. Tauffer[29] and Schramm[32] have devised plastic operations for conversion of uretero-vaginal fistulæ into bladder grafting. They are done in the vaginal roof. The desirability of such work is apparent, as many cases are reported (Boldt[33] says that in a case of uretero-vaginal fistula the kidney became infected, and he was obliged to resort to nephrectomy, which saved his patient) in which fistulæ have resulted with subsequent kidney infection, requiring nephrectomy. Boldt's case again shows the importance of some form of defense against infection by the orifice of the ureter, and supports Boari's (*loc. cit.*) suggestions as to the value of the sphincter. Grafting the ureter to the skin is scarcely more satisfactory than rectal implantation. It may, however, be done as an expedient preparatory to the establishment of a new urinary passage to the bladder, as recommended by Rydigier.[43] His plan is to take a channel of the skin, and, joining it to the two ureteral ends, complete the canal from kidney to bladder. Implantation to the skin may be applied to cases of anuria when due to compression of the ureter from some inoperable tumor. Under such conditions infection of the urine and kidney could be prevented for a short time, at least, by antiseptic dressings. This would be very tedious if carried out for an indefinite period. Le Dentu was the first to successfully practice this form of ureteral grafting, in a case of cancer of the uterus, though the woman died a short time afterward. Implantation of the ureter into the urethra, proposed by Gluck and Zeller, was successfully practised on man by Nichaus in one case (Boari, page 7). Adolfo Schwarz[46] succeeded in removing the bladder in dogs and grafting the ducts as mentioned. At first the incontinence of urine was almost constant, but after a few days it improved materially, and in a few weeks was nearly absent. A well-defined bladder had been formed from the urethra, and even a sphincter vesicæ from its muscles. This was in

the female. It is a question whether a vaginal graft of an injured ureter, when possible, is not better than attaching it to the skin or the bowel, particularly if a vaginal operation for making a bladder-graft of the duct is later done. It is scarcely worth mentioning that an open wound for simple drainage of the urine, without attempting to suture the ureter, may be made. Yet our patient may be in a condition that will not permit sufficient delay for the repair or implantation of the injured structure; then such a procedure might be justifiable.

Of the methods employed for destruction of the urinary function of the injured side we have two ways of procedure: simple ligation of the ureter, to produce a backing up of the urine and consequent cessation of the kidney function, and nephrectomy. The latter is far inferior to any of the forms of grafting employed, and even to simple ligation of the ureter. This latter procedure is extremely easy, and if the urine is known to be sterile, then it is applicable in some rare cases. This results in backing up the urine excreted, distending the ureter, then the pelvis of the kidney, and, later, the uriniferous tubules of the kidney until the pressure of the blood is equalled or possibly exceeded by that of the urine. In this manner is produced arrest of kidney function, as shown by James's experiments. If we do happen to infect the duct during the operation, or if it be infected previously, then the danger is extreme. Even if this contingency be absent, we cannot be sure that other complications which readily suggest themselves to us may not arise. In all cases of destruction of the kidney function we should be sure there is a kidney on the opposite side, and that it is functionating well. Even then it is a very dangerous procedure. A quite important point in ureteral grafting is the ligation of the lower portion of the duct. This is not always necessary, but a number of cases have been reported in which, after the kidney and a considerable portion of the correspondng ureter have been removed, urine has continued to come from the wound and later found to be passing from the bladder through the cut ureter.

Modlinsky[32] and Pozzi[40] report cases of this kind.

It would seem a loss of time to mention nephrectomy for such ureteral injuries as come within the limits of this paper, but the frequent reports of nephrectomy under such circumstances are altogether too common to permit us to warn you against this operation, except when no other plan can be followed.

This method of treatment is applicable to transverse section of the ureter, whether complete or partial (except very slight wounds), as follows:

1. Accidental wounds during surgical operations.
2. Ruptures and injuries from external violence.
3. Exsection of not more than three inches for removal of malignant or benign growths.
4. For obliteration of the duct by inflammation, compression, or other cause, not to exceed three inches, accompanied by ureteral fistula or otherwise.
5. Necrosis from contact with calculi to such an extent that posterior drainage would not prevent a very considerable narrowing of the calibre at the point of injury.
6. In nearly all cases in which leakage from the ureter into the abdominal cavity occurs.

This method of repair of the ureter is applicable even if a considerable portion of the duct be removed. If we loosen the organ from its attachments a few inches above and below the seat of injury, and make steady, careful, and light traction on both extremities, the amount of apparent surplus of its length will soon be perceived. Robson cut out two inches of the duct and successfully did an end-in-end anastomosis which required about another inch of it.

In the writer's case at least an inch was removed, and it was noticed at the time that considerable more of the tube could have been spared and yet the approximation been made. The use of the ureteral catheter during the operation, as practised by Tauffer in his two cases, or of using it during the operation and leaving for drainage afterward, as Pawlik did, seems to the writer of no benefit, even if it be

not harmful. In the case of the last-mentioned surgeon it slipped out, owing to the restlessness of the patient. As the patient had been subjected to a very severe operation, from which she died, we are not justified in attributing the restlessness to the presence of the catheter; yet we must agree that the presence of a foreign body in the ureter, already badly injured, must annoy a patient to no little extent.

Anomalies. It is well to bear in mind that anomalies of the ureter frequently occur, and, if possible, to take advantage of them when placed in the unfortunate position of having an injured ureter to deal with. Arden-Deltiel, of Montpellier,[1] and Smith[48] record cases of two complete and entirely separate ureters on one side; and cases of double ureter of one side coalescing just before emptying into the bladder have been reported by Wood,[54] Porter,[39] and others. Indeed, this latter condition seems to be very frequent. Others have reported cases of double complete ureters on both sides. Anomalies are so common that we should bear it in mind, as in such event we many find it unnecessary to resort to the delicate surgical work of repairing a cut ureter. Ofttimes they are divided above or below, and the repair may resolve itself into the ligation rather than the repair of a cut ureter.

After-treatment. As mentioned elsewhere, drainage may or may not be necessary, according to the presence or absence of pus in or about the cut ureter. Should there be a history of syphilis, tuberculosis, or other condition of the patient causing suspicion that the healing of the wound would not be prompt, drainage would also be advisable. *Per contra*, if the wound in the duct be nicely approximated and there be no other condition to indicate it, drainage will be unnecessary. So many cases of back-flowing of urine have been reported from antiperistalsis or other cause that we should do our best to assist the escape of the urine from the bladder by the urethra. This may be done by frequent catheterization for the first two or three days, or even by leaving a bladder catheter in place for the same length of time. Since the danger of infection (of at least the bladder) is greater by the

latter plan, it is probably less advisable. During the first few days the urine should be measured. Very frequently after abdominal operations the quantity of urine excreted is very much diminished for a few days, and even suppression may occur. This consideration renders less valuable its measurement. But if a fairly normal amount be excreted we feel that not much trouble is present in the urinary tract.

RESULTS. As previously mentioned in this paper, but three cases have been reported that were done by the Van Hook method. All recovered, but no positive statement is made as to whether subsequent constriction or its consequences occurred in either of them. Van Hook and Bloodgood have reported no constrictions in the dogs they operated upon—one three weeks, and the other two and one-half months after operation. These reports show pretty certainly that the results of this method are good. Of the experiments of Poggi, using the end-in-end method, it is said they were absolutely successful. In one dog the anastomosis was done with both ureters, and in both dogs recovery occurred without leakage of urine and without the slightest constriction of the duct. These dogs were killed fifteen days and three and one-half months after operation. Budinger and Tuffier had deplorable results from their experiments by this method. It is but fair to presume their technique was faulty. Robson's, the only case done on man by this procedure, is briefly reported as successful. He also gives no subsequent history. Seven cases have been done by the transverse end-to-end approximation, and so far as leakage goes all were successful. One of them died too early to furnish us any information as to constriction. Another died in twenty days, and the report of the autopsy gives us no light on that subject. A third case died of tuberculosis at the end of seven weeks, and at the autopsy were found a dilated bassinet and contracted kidney on the affected side as well as incarceration in dense fibrous tissue of the ureter at the point of injury. There was also amyloid degeneration of the left kidney. It is hardly proper to consider this case at all in this connection as

the condition of the patient during the process of repair assisted in the destructive work at the seat of injury to the ureter. Besides, the adhesions and ureter were severed with the thermo-cautery, which undoubtedly produced great cicatricial contractions, even in the ureter itself. Aside from these three cases four successful ones are reported. Of these not one furnishes us with any intelligence on the later conditions of the duct. However, as they were all reported some months after operation, they may be considered practically as having had no subsequent trouble. Of the oblique end-to-end anastomosis of the ureters, the writer has not been able to learn of any experiments being done on lower animals, and his case is the only one in which the method is known to have been employed. The result is certainly as good as in any case ever reported, and there seems to be no reason why it is not as applicable, as good in theory, as easy in execution, and as certain in its happy result, as any method thus far devised. The objection of Van Hook to all methods of uretero-ureteral anastomosis other than his own is apparently based upon the unsuccessful experiments of Tuffier, Budinger, and a few others upon the dog, whose ureter is known to be a very small, delicate tube, and possibly Schopf's case. We feel that we must dissent from the fourteenth conclusion of his admirable paper on "Ureteral Surgery," which is "in complete transverse injuries of the ureter in continuity, union must not be attempted by suture."

In the cases herein reported, with the possible exception of that of Schopf, we see positively no evidence of the slightest evil effects of suturing complete transverse injuries of the ureter.

Conclusions. 1. Uretero-ureteral anastomosis is a perfectly feasible procedure.

2. Uretero-ureteral anastomosis, whenever possible, is far preferable to any other form of ureteral grafting, to nephrectomy, and to ligation of the ureter.

3. It should be done preferably by lateral implantation or by oblique end-to-end anastomosis, though the transverse

end-to-end or the end-*in*-end methods may be safely employed.

4. That constrictions of the calibre of the ureter do not usually follow attempts at suturing in closure of complete transverse section of the duct.

5. That nephrectomy for transverse injuries of the ureter *per se* is an unjustifiable operation.

6. That simple ligation of the ureter to produce extinction of the function of the kidney is too uncertain to justify its practice.

7. That drainage is not necessary if the wound be perfectly closed and the tissues throughout are aseptic.

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DISCUSSION.

Dr. Howard A. Kelly, of Baltimore, Md.—Mr. President: I feel a warm interest in this subject, and have been particularly interested in listening to Dr. Bovée's admirable summary of all the work that has been done along this line, including his own, bringing this important literature up to date; his conclusions, too, will help us in our future work in the surgery of the ureters. Every abdominal surgeon should be familiar with uretero-cystostomy or uretero-ureterostomy, because in our various pelvic operations we are all liable to injure the ureters, and may be suddenly confronted with the necessity of doing something for the injured organ. A practice initiated by Simon was to take out the kidney if the ureter was cut; but, as Dr. Bovée correctly says, it is now no longer good surgery to sacrifice the kidney. The ureter may

be cut in performing operations in a variety of ways. It is liable to be cut in hysterectomy for carcinoma of the uterus, particularly in carcinoma of the lower segment of this organ, which so fills out the broad ligament that the operator, thinking he is near the cervix and away from the ureter, may really be working near the pelvic wall, and so catches and divides the ureter before he is aware of it. The ureter may be cut in the enucleation of a pus-tube or ovary or an ovarian cyst which has grown so densely to the pelvic wall that the ureter is caught in tying it off. It is liable to be cut in removing fibroid tumors of the uterus by abdominal hysterectomy. It is important, in the first place, to know how to avoid these injuries of the ureter. In hysterectomy for carcinoma of the uterus we shall avoid injuring the ureter if we put the patient in the knee-breast position, inflate the bladder, and run bougies or catheters into the ureters. This is often a simple matter, and does not take more than a few minutes. This being done, the ureters now, instead of being soft, flexible, non-palpable cords, become stiff, resisting cords, easily felt. They are no longer readily pulled down with the tissues, but remain splinted out against the wall of the pelvis by the elastic bougie. We have the ureter under touch constantly and can boldly dissect it out for several centimetres. We can also dissect carcinomatous nodules from the ureter and avoid injuring it. In the operation for fibroids, when the fibroids are developed from the lower segment of the uterus, particularly the cervix, the ureter is displaced by the tumor developing beneath the peritoneum, and we are liable to injure it.

My case, to which Dr. Bovée referred, was an instructive one. During a hystero-myomectomy for the removal of a large tumor I mistook the enlarged ureter for a big vein, and, after double ligating, I divided it. I at once did uretero-ureteral anastomosis by tying the lower end close to its cut surface and making a longitudinal slit, one centimetre long, in its anterior wall about half a centimetre below the ligature, and then invaginating the patulous upper end into this slit and suturing it there.

Having divided the ureter during an operation, the question arises as to how to repair it. My rule would be this: if the ureter is cut in the lower part of the pelvis anteriorly, I should prefer to turn it into a hole in the bladder and suture delicately

around the peritoneal surface of the bladder, and so make the anastomosis; anastomoses made in this way have been uniformly successful.

In the case of a vaginal hysterectomy, operated on a year and a half ago for carcinoma in which the ureter was cut, I at a later date opened the abdomen of the patient, and, as I could not reach the anterior end of the ureter, I caught its upper end and tried to bring this to the bladder; but I could not get the bladder to meet the ureter without pulling on both so strongly that it was evident they would pull apart shortly after the operation. I met the difficulty by dissecting the bladder loose on the sides, freeing it from the pubic bones, and pulling it out in a Gibbon's form toward the ureter, when a ureteral anastomosis was easily made.

Dr. Russell had a case about ten days since in which he almost divided the ureter. He must have cut it about three-fourths through, and simply left it hanging by a narrow bit. Instead of doing an anastomosis as I do in these cases, he simply sutured it end to end, and his plan succeeded perfectly. This was practically an end-to-end anastomosis.

I hope Dr. Noble, of Philadelphia, will give us his experience along this line, as I know of some interesting and instructive cases which he has had which have not as yet been published.

Dr. Charles P. Noble, of Philadelphia, Pa.—My experience with this work has been small, and all of the cases have occurred within the last year. The first case that I saw was a patient who was very ill with extrauterine pregnancy. It was one of those neglected cases in which there was a large effusion of blood, and the extrauterine pregnancy occurred in a woman who had an intraligamentous ovarian tumor. The hæmatocele had been present for six weeks; there had been recurring hemorrhages, so that the anatomical condition in the lower abdomen was very much mixed up. It is possible this case was one of intraligamentous rupture of the extrauterine pregnancy. If so, it is the only one I have seen. At all events, in operating upon the case through a long incision the intestines were apparently adherent over the mass of blood, and a large, fleshy adhesion ran up into the mass of blood, and to save time this was clamped, cut through, and then the pelvis was cleaned out. It was necessary to do a

hysterectomy in order to get anything to tie, as the anatomical landmarks were obliterated on both sides of the pelvis. We had no broad ligaments to go down on in the usual way. When the operation was completed the patient was in collapse, and it was discovered that what was supposed to have been a fleshy adhesion was really the ureter and thickened peritoneum, and the ureter was cut off almost to the kidney itself. Of course, the lower part of the ureter was taken out with the mass of blood, so that we had the situation of a woman who had no ureter, except the upper three or four inches of it, confronting us. Whatever the theoretical considerations may have been, we had a patient in collapse, and had any attempt been made to prolong the operation she would have died on the table. So that in her case the ureter, although it was very short, was dragged up into the upper end of the abdominal incision, and she recovered from the operation. In that case it was impossible to do a ureteral anastomosis; it was impossible to switch the ureter into the bladder because it did not reach anywhere near down to the brim of the pelvis, much less the bladder, and there was nothing else to do but to take out the kidney, which I did, and the patient has recovered. I might say in passing, although it is not strictly germane to the subject, that I felt uncomfortable in taking the kidney out through a lumbar incision after having tied off the renal vessels. I found two ureters running from this one kidney. The kidney was large. It occurred to me that this might be an anomalous case in that we had one kidney with two ureters, one of which I had cut off, and now I was taking out her only kidney, but it proved to be a case of double ureter.

The second case was not one of my own, but one in which I was an assistant. The patient had cancer of the left ovary, papillomatous in character, with the involvement of the broad ligament and pretty much everything in the pelvis. The ureter was cut off down to the broad ligament. The operation was proceeded with, and at its close, the ureter having been watched, it was seen that no urine had run out of it, and this fact, together with the fact that the patient had advanced cancer, led me to advise the operator to bring the ureter up into the abdominal wound, and it was done. No urine passed through the ureter, showing that the kidney had atrophied through pressure caused

by the cancer in the broad ligament. This patient became insane afterward, and the last I heard of her was that she was in an insane asylum.

The last case I had was in a patient who had an enormous ovarian cyst, with a history of its existence extending over some eight years. There were two intraligamentous cysts, one on each side, which weighed sixty pounds. In enucleating the various lobules of the ovarian tumor upon the right side the ureter was found passing down between the lobules of the ovarian tumor; the tumor extending four or five inches behind the ureter, pushing the latter forward, so that it ran down in the middle of the ovarian mass. The ureter in this case was very friable, and although in plain sight and handled carefully, yet it ruptured over three-fourths of its circumference, leaving it in practically the condition which Dr. Kelly referred to in Dr. Russell's case, and I treated it as Dr. Russell did. I carefully sutured it; but, as this patient was also in a critical condition, I did not take as much care as I usually would in suturing. I put in a subperitoneal drain, passed it into the vagina, and buried the ureter behind the peritoneum with sutures. No urine leaked from the ureter, showing that the suturing was entirely satisfactory. The patient died of œdema of the lungs on the twelfth day after the operation.

I have given you my entire experience with injuries of the ureter, and it is of interest as showing that any surgeon may injure it in his operations, which injuries cannot be dealt with in some cases either by anastomosis or switching of the ureter into the bladder, and it is absolutely essential in some cases to switch it into the bowel (which I would not do myself), or to allow a permanent ureteral fistula remain (which is such a nuisance that it should be avoided), or to take out the kidney. I think there are cases in which there is nothing left but to do a nephrectomy.

Dr. Bovée (closing the discussion).—I did not have time to read all of my paper, but in it I stated that anastomosis is applicable only to cases in which there is less than three inches of the duct gone, and it is not applicable to the lower two inches of the duct. I also exclude the cases of such operations as Mynter, Kuster, and Fenger have done at the upper end of the duct—in

fact, I excluded longitudinal injuries of the duct. It is merely for transverse injuries. It is practically limited to transverse section, complete or nearly so, of the ureter in that portion of it between the first inch from the pelvis of the kidney down to the lower two inches of the duct, and in no case where there are more than three inches of the duct destroyed. In the case of Dr. Noble we did not have any such condition. There was a case in which the whole ureter was taken out, and he did the only thing that could be done except implantation into the bowel, which perhaps was the thing to do. I do not think that implantation into the bowel is the proper thing to do in these cases. Rydygier makes a channel of the skin down to the bladder and reaches the bladder with a skin canal, but that would be a desperate thing to undertake in such a case as Dr. Noble has mentioned.

I touched on the subject of anomalies of the ureter in my paper. They are common. Cases of anomalies of the ureter have repeatedly been reported in literature of autopsies made in which there have been found double ureters on one side, generally about an inch from the bladder. That is the most frequent anomaly. Then there are many cases of double ureters on one side and a less number of cases of double ureters on both sides. I suggested in my paper that it would be well to examine for anomalies of the ureter, because it might be the injured ureter could be treated in some manner more easily than that of suturing the ends together—that is, by perhaps cutting out a portion of the ureter or fastening one to another.

The alternatives that were mentioned for this operation, such as implantation into the bladder, rectum, ascending or descending colon, small intestine, vagina, and its grafting on to the skin, and of nephrectomy, were subjects that were only slightly touched on in the paper. In the light of the histories of these cases I think it is better to attempt implantation of a small amount of the ureter into the bowel from the kidney and leave the kidney functionating than to do a nephrectomy. In the cases of implantation, if infection does occur, the kidney can be removed, and, of course, you would not have the urine examined in such cases to inform you, but would have to decide upon the general condition of the patient and the local condition of the kidney.

There is another alternative which I did not mention. Schwarz, of Italy, an assistant of Bassini, has experimented on the removal of the bladder in a bitch, implanting the ureters into the urethra, with the result of first having incontinence of urine. After a couple of weeks there was considerable retention of urine, but five months later a perfect bladder had been formed, and, more than that, a perfect sphincter vesicæ formed by the muscular tissue in the outer third of the urethra. This procedure has been successfully carried out by one surgeon in one case. I think implantation into the bowel would be justifiable in any case rather than nephrectomy; but if we should decide to do nephrectomy, we must be sure the opposite kidney is one that is enabled to carry on the function of excretion of the urine if called upon to do that work.

THE TREATMENT OF PREGNANCY AND LABOR COMPLICATED BY FIBROID TUMORS OF THE UTERUS.

By Henry D. Fry,
Washington, D. C.

My aim is to present this subject for discussion from the standpoint of the obstetrician, and not the gynecologist. The treatment of a woman with a rapidly growing tumor is of secondary consideration. The management of pregnancy complicated by this condition is of prime importance, and the claims of the child are brought forward to our earnest consideration.

The propositions I wish to advance are:

1. The production of abortion is unjustifiable.

2. Labors presenting serious difficulty to delivery are best treated by abdominal section and removal of the child and tumor.

By maintaining this position the interests of the mother are not relegated to second place. While saving the life of many infants, the maternal mortality will also be diminished.

Your attention is first directed to a few points relevant to the subject.

The association of sterility with fibroid tumors of the uterus has been long recognized by the profession. Opinion is divided as to which stands in the relation of cause and effect, but the weight of evidence seems to bear out the theory that the fibroids cause the sterility. The influence of the growth in this respect depends somewhat upon the relation it bears to the uterine wall.

Pregnancy occurs more frequently in subserous growths

than in interstitial, and least often in the submucous varieties. Changes occurring in the fibroids as a result of the developmental process imparted by pregnancy are likewise influenced by the same condition. Softening and increased growth are least marked in subserous, pedunculated fibroids, and greatest in interstitial and sessile tumors. The increased growth imparted by gestation is sometimes incredible. Spiegelberg refers to a case in which a retrocervical myoma, which was scarcely noticeable before pregnancy, attained such a size when labor came on at full time, that in spite of the death of the fœtus, Cæsarean section became necessary.

Pain and pressure-symptoms augment in proportion to the enlargement and position of the growth, and bear the same relation in this respect to similar conditions under ordinary circumstances. Under the influence of the involuntary, rhythmical contractions of the pregnant uterus submucous fibroids may be gradually extruded into the uterine cavity and become pedunculated, or may even project from the cervical canal. Likewise favorable changes may be observed in interstitial or subserous sessile tumors of the lower segment of the uterus, by which they gradually mount up out of the pelvis and become intra-abdominal. This favorable change may render delivery *per vias naturales* possible at full term, when it had seemed hopeless during the second trimester. Still another favorable alteration is sometimes met with during pregnancy in the flattening of the fibroid tumor, by which the pelvic obstruction is relieved.

Pregnancy complicated by fibroids of the uterus is not infrequently interrupted—submucous growths are particularly apt to produce abortion. Retroflexion and incarceration of the pregnant womb may precede the expulsion of its contents.

Gusserow has collected 796 cases of pregnancy complicated by fibroid tumors, and of this number 166, or about 20 per cent., aborted. Hemorrhage after abortion is often fatal if the placental site be located over the tumor.

The frequent complication of incomplete abortion in these cases, the deficient drainage owing to tortuosity of the canal,

and the resultant sepsis combine to give a mortality of about 12 per cent. If gestation should proceed to full term, labor is likely to be complicated by malposition[1] of the fœtus, prolapse of the funis, hemorrhage, and placenta prævia. Irregular labor-pains or intrapelvic location of the tumor interfere with dilatation of the cervix, and thinning of the uterine wall at other parts may lead to its rupture. Puerperal sepsis occurring in a uterus complicated by a fibroid growth is fraught with gravest danger as the septic process is most likely to invade the tumor and lead to sloughing.

With these brief remarks on the natural history of fibroids complicating the pregnant state I will report a few cases that have come under my care before taking up the consideration of treatment. Subperitoneal growths have not infrequently come to my attention, which, from their position and size, have not influenced in any respect the pregnancy, labor, or puerperium. In some instances their presence has not been detected until after labor.

One of the earliest and most marked of these cases occurred about seven years ago. The woman had a normal labor and convalescence, although her uterus was studded over the corpus and fundus with subserous fibroids, some of them larger than my fist. February 2, 1892, I attended her at term in her second confinement. When I arrived at her house the waters had escaped a short time, and there was a shoulder presentation with prolapse of an arm. Placing the woman in the knee-chest position, I readily replaced the arm, turned and brought down a foot. The labor was quickly terminated by uterine action, and the mother and child did well. A brother practitioner recently informed me that he had, a short time ago, attended the patient through an attack of typhoid fever, and her uterus is now so much enlarged by fibroid growths that it is the size of a seven-months' pregnancy.

1 Frequency of malposition is shown by the following observations: Nauss, 86 cases; 18 shoulder presentations and 22 breech. Tolocinow, 48 cases; 12 shoulder and 16 breech. Lefour, 102 cases; 17 shoulder and 33 breech.

In November, 1894, I was called in consultation by Dr. A. Behrend, of Washington, to see a patient with a six-and-one-half months' pregnancy complicated by an interstitial fibroid. The uterus was uniformly enlarged to the size of eight-months' pregnancy. The patient complained of constant pain, day and night, which interfered with rest. This had been unendurable, and some relief was sought. Vaginal examination revealed the uterus and contents jammed down into the pelvis, the os displaced backward to the sacral cavity, high up, and reached with difficulty. It was impossible to displace and push upward the presenting part.

The sufferings of the patient demanded that something should be done for her relief.

She was sent to the Garfield Hospital, and on November 12th I opened the abdomen for the purpose of exploration, the subsequent steps to be guided by the condition found. The uterus was generally enlarged by an interstitial growth, and upon the posterior surface of the corpus was a band of adhesions several inches broad. During manipulation this band suddenly gave way and the released uterus ascended into the abdominal cavity. No further steps seeming justified, the incision was closed.

The patient had no bad effects, the pain was relieved, and she went comfortably to full term. Vaginal examination revealed relief of the impaction.

During my absence from the city Dr. Behrend attended her in confinement, and, expecting some trouble, he sought the counsel of Dr. T. C. Smith. From the latter I learned that the forceps was applied to complete the delivery, and there was some bleeding. After the birth of the child Dr. Smith placed his hand on the abdomen, and, for the moment forgetting about the fibroid, he thought there was another baby in the uterus. The tumor seemed as large as an adult head.

On April 29, 1896, Mrs. S., primipara, was confined at full term. Previous to her last pregnancy she had suffered from uterine trouble and profuse menstruations. The labor was normal and the expulsion of the placenta was followed

by profuse flooding. The hand introduced into the uterus for the purpose of clearing out clots detected a submucous fibroid upon the posterior wall. A hot intrauterine douche, ergot, rubbing the uterus, and cleaning out the clots failed to arrest the flow. The introduction of the iodform-gauze packing into the uterus was successful, but not until the patient had showed alarming signs of collapse. She made a perfect recovery.

L. G., white, aged thirty-three years, primipara, was admitted to Garfield Hospital, March 4, 1896, advanced about three months in pregnancy. Her last child was born in 1882; the labor was severe, and lasted thirty-six hours. Since that confinement she has suffered with uterine hemorrhages during and between menstrual periods.

During this pregnancy she has been in great pain, which was augmented as each menstural cycle approached. A swelling appeared at the median line and to the right side, and has increased in size rapidly. Examination by palpation revealed a nodular growth extending to the epigastrium and filling the right side of the abdomen.

Per vaginam, the cervix and lower segment of the uterus on the right side were softened; on the left side a nodular fibroid was felt low down between the folds of the broad ligament.

Diagnosis of pregnancy at third month, with multiple fibroids. After watching the case a few weeks it was apparent that no hope could be entertained of allowing gestation to proceed to viability of the infant. On March 18, 1896, she was sent to the operating-room, and the uterus and tumors were removed by supravaginal hysterectomy. The patient made a perfect and uneventful recovery.

Inspection of the specimen showed a subperitoneal fibroid as large as a fœtal head at full term, attached by a pedicle to the posterior surface of the uterus; an interstitial fibroid as big as the fist in the right cornu, and a second interstitial growth on the left side of the uterus extending down from the tube to the level of the internal os. The latter growth

was intraligamentous, and blocked up the left half of the pelvis.

L. W., colored, aged twenty-five years, primipara, was admitted to Columbia Hospital, May 18, 1896. Her pelvic measurements were normal; child presented left occipito-anterior position; urinalysis satisfactory. Vaginal examination revealed a sessile fibroid tumor within the pelvic cavity, anteriorly and somewhat to the left of the median line. She was taken in labor July 27, 1896. The growth gradually ascended out of the pelvic canal, and after nineteen hours of labor the child was delivered naturally. Male, weight eight pounds and fourteen ounces.

Mrs. H., primipara, consulted me July 30, 1896, having been referred to my charge by Dr. B. F. Baer, of Philadelphia. She stated that her menstruation had been regular until February 14, 1896. During May a hard enlargement was noticed on the right side of the abdomen. Dr. Baer was consulted, and found the lump was a fibroid tumor attached by a pedicle, and on vaginal examination he further detected a fibroid within the pelvis. She was five months pregnant, and had continued under Dr. Baer's observation until her husband's duties called them to Washington. My first examination revealed the presence of a large intraligamentous sessile fibroid on the right side of the pelvis.

I kept the patient under close observation, examining her from time to time and giving such supervision of her pregnancy as the case demanded. As utero-gestation advanced I had the gratification to detect a sensible elevation of the growth, until finally, when a little past the eighth month, I discovered that the obstruction had been entirely removed from the pelvic cavity. The head of the infant was well down into the canal in the left occipito-anterior position. Her confinement is expected about November 21st, and I now have every reason to believe no difficulty will be encountered.

About this same time, August, 1896, Mrs. T., primipara, an unusually intelligent mulatto woman, came under my observation, having been sent to me by Dr. W. W. Johnston,

of Washington. A little more than a year before she had been confined and gave birth to a dead child. The child had presented by the breech, and her labor had been protracted.

She grieved very much at her loss, and several months afterward called on Dr. Johnston for an examination to be made of her pelvic organs. This was done, and he discovered a fibroid on the right side of the uterus. Nothing more was seen of the patient until she again came to Dr. Johnston when about five months pregnant. He kindly referred the case to me, and when six and one-half months advanced in gestation she presented herself for examination. The result was I found a very large, intraligamentous fibroid tumor obstructing the pelvic canal.

It was similar in character and location to the preceding case, except that the tumor was much larger and displaced the cervix to the opposite side. Abdominal palpation revealed the head on the left side of the mother, the left shoulder presenting and the abdomen to the front. The condition was serious, and I apprehended the necessity would arise for surgical interference.

The patient was informed of the presence of the tumor and the obstruction it would offer to birth *per vias naturales* unless it changed its position. The importance was impressed upon her of the desirability of weekly examinations.

A second visit was made within a few days, and the patient, being anxious and nervous about her condition, interrogated me closely concerning all the possibilities of her case. The situation was explained, and the dangers to herself and child plainly put before her without undue exaggeration.

The gravity of the situation seemed to demand perfect frankness. The result is I was considered an alarmist, and the patient returned but once more to say she had not made her final arrangements, and might go to her mother's home in New York to be confined. This I considered equivalent to a dismissal, and the case passed out of my care.

The treatment of pregnancy complicated by fibroid tumors

of the uterus will be taken up by considering the first proposition advanced.

The production of abortion is unjustifiable, first, because it destroys the life of the child. In some cases, however, this is unavoidable, but in others the gestation may be prolonged to viability or even to full period. In a certain proportion of the latter cases delivery may even be terminated *per vias naturales*, when, in the first and second trimester, the chances seemed hopeless. Who, then, is warranted in destroying the life of the embryo in early pregnancy because of the presumable difficulties that *may* not be overcome?

A case has been reported in this paper demonstrating the wonderful resources of nature in overcoming these obstructions in pregnancy, and the same is well attested by a number of observers.

Given a case which has passed through utero-gestation without such a favorable change having taken place, what then? Still give nature a chance. Under the influence of labor-pains the growth may yet recede out of the pelvis. The contraction of the longitudinal muscular fibres, their rearrangement in the corpus, the thickening of the uterine wall above the ring of Bandl, and the thinning of the lower segment of the uterus are well-established physiological changes. These same may elevate a pathological excess of tissue above the contraction ring. An example of this has likewise been recorded in the present paper.

Dr. Mann[1] says, "In a number of instances I have seen a tumor in the lower segments of the uterus look, early in pregnancy, as though it might make the labor impossible. I have been astonished to see this same tumor, when the labor came on, get out of the way of the advancing head, ascending out of the pelvis as the child descended, thus allowing the labor to come to a successful termination. I have three times been ready to do a Cæsarean section for fibroids in the

[1] The Sloughing of Uterine Fibroids After Abortion and Labor.—American Gynecological and Obstetrical Journal, April, 1896.

pelvis, and each time the labor has been completed without any further interference than the application of the forceps."

Reynolds,[1] after speaking of the use of taxis and elastic intravaginal pressure, says: "Otherwise the case should be left to nature, since these tumors are largely muscular in their structure and are subject to the same processes of softening and retraction with which we are familiar in the cervix, and because by this process tumors which seem to oppose a hopeless obstacle are usually entirely effaced and withdrawn above the head in the most surprsing manner during the progress of labor." In a footnote he further adds: "The author has himself seen, or known personally, four cases of incarcerated fibroids first discovered during labor, three of which were terminated by natural labor, and one by low forceps for failing pains, after the complete retraction of the tumors."

While recognizing nature's claims for a fair trial, we must be careful not to permit the labor to be prolonged sufficiently to exhaust the woman and jeopardize the chances of surgical interference. The lives of mother and child are then equally imperilled. The chances of a successful elevation of the growth are increased in proportion as the situation of the tumor is toward the median line anteriorly, as the depth of the pelvic cavity diminishes progressively from behind forward. The broader the attachment of the growth to the uterus, the better the chances for softening and withdrawal upward.

Pedunculated tumors may be disengaged and pushed up above the brim by the fingers, aided by posture.

I have said that sometimes the destruction of the life of the child is unavoidable. Surely, then, in these cases it may be said the production of abortion is justifiable. Let us see if that be so. The dangerous complications which so often set in after spontaneous abortion have already been referred to as causing a maternal mortality of 12 per cent.[2] The

[1] Practical Midwifery, p. 259. New York: Wm. Wood & Co., 1892.

[2] Lefour, in 307 cases, found 39 abortions, ending fatally to the mother fourteen times. Pozzi: Med. and Surg. Gyn., vol. i. p. 327. Wm. Wood & Co., N. Y.

constrictions and tortuosities of the cervical canal prevent the complete casting off of the ovum. The deficient drainage adds to the invitation for septic trouble, which too often spreads to the fibroid growths The success of active local treatment is often defeated, and it is impossible to clean out and disinfect the cavity of the uterus.

The same difficulties and dangers apply with equal or greater force to the artificial production of abortion.[1] I will emphasize this point by the evidence furnished from a single writer. Dr. Mann, in his valuable contribution, from which I have already quoted, gives this interesting case, showing the fatal result of the interference even when made under the most favorable conditions for aseptic work. He was consulted by a woman thirty-five years of age, pregnant for the first time. She was two months advanced in pregnancy, and her condition was complicated by fibroid tumors of the uterus.

She was advised to wait until the fourth month, and if the tumor continued to grow abortion would be induced. At the time specified she entered Dr. Mann's private hospital. He found some difficulty in causing the expulsion of the fœtus ; the placenta did not come away, and he removed it as best he could with his finger and the placental forceps, and then thoroughly washed out the uterine cavity. Septic fever occurred, and in spite of intrauterine douching the patient grew worse. On the tenth day he opened the abdomen, and there was an odor of decomposition. A large tumor which was attached by a pedicle as thick as his wrist was black and putrified. He removed the uterus with the growth, and on opening it found a small piece of putrid placenta at the upper angle. The patient died twenty-four hours after the operation.

Had Dr. Mann, with his well-known skill, opened the abdomen, instead of inducing abortion, he could have removed the growth by myomectomy. His patient would most likely

[1] Thirty-one cases of induction of artificial abortion collected by Gusserow and Lefour give six deaths or a mortality of 20 per cent.

have survived to bear a live child at full term. This case carries an important lesson and accentuates the danger of inducing abortion even when performed under the most favorable surroundings.

Dr. Mann adds another instructive case. A woman, thirty-two years of age, when three months pregnant was discovered to have multiple fibroids. When five months advanced she had a miscarriage and passed a fœtus partly macerated. The placenta was removed with difficulty, the uterus washed out with bichloride solution and packed with iodoform gauze. Sepsis developed, and this is the subsequent history: The patient was seen by Dr. Hunter Robb, who examined her under ether and curetted the uterus. Intrauterine douches were then used. Dr. E. C. Dudley, of Chicago, saw her later and advised hysterectomy if the symptoms did not abate. Dr. W. M. Polk, of New York, next saw her. Dr. Mann was called still later, about three weeks after abortion, and found fragments of sloughing fibroids hanging from the uterus. He was prepared to perform hysterectomy, but the preceding night a septic pneumonia developed, and there were later some symptoms of gangrene of the lung. Dr. Roswell Park resected several ribs to secure drainage, but the patient died ten days later from exhaustion.

There still remains a class of cases which are held by some to be best treated by abortion.[1] Cases where the complication is discovered in the early months of pregnancy, and where, from the location of the growth, no serious obstacle will be met with in emptying the uterus. Now these are the very cases which are apt to undergo favorable changes during pregnancy, and which can often be delivered naturally. By such a line of treatment the child's life is sacrificed and the mother, if she escapes the dangers of induced abortion, still has her

[1] Another very important therapeutic procedure to be considered is the production of abortion. A positive rule cannot be laid down, but the following may serve as a guide. If the choice is given at an early period of gestation (up to the third month) abortion should be produced, this being, then, with ordinary precautions, practically free from danger.—Clinical Gynecology, Keating and Coe. J. B. Lippincott Co., Philadelphia, 1895.

fibroid uterus. She must subject herself later to a second danger by seeking surgical relief or run the risk of subsequent pregnancies and abortions.

Cases of pregnancy complicated by fibroid tumors of the uterus, which cannot proceed either to viability or to full term. The size and location of the tumors demand early interference. This may be of two kinds.

To overcome the obstacles and then permit the gestation to proceed. Submucus fibroids attached by a pedicle and fibroids growing from the intra-vaginal portion of the cervix should be removed if possible per vaginam. If the operation promises to be tedious or severe it ought to be delayed if possible until the latter months. Tumors originating in the supra-vaginal portion of the cervix posteriorly may produce incarceration and demand abdominal section and myomectomy. If attached posteriorly by a pedicle the tumor may be reached through the vaginal vault, as was done by Price.[1] At the fourth month of pregnancy a large pedunculated myoma was attached to the posterior surface of the uterus. He incised through the posterior vaginal fornix and clamped the pedicle. Patient recovered and was delivered at term. Fibroid tumors above the pelvic brim may interfere with the progress of gestation by their large size and pressure effects. Myomectomy in properly selected cases gives a fair prospect of success. Subserous and more or less pendunculated growths are favorable for myomectomy, and the recent operations give a mortality of about 8 per cent. The fœtal mortality is placed by Stavely[2] at 30 per cent. In the second class of cases, where interference is demanded, it is impossible to overcome the obstacles. Pregnancy cannot proceed further, and the patient's condition calls earnestly for relief. In such cases the best results will be secured by hysterectomy. I have reported among my cases one of this nature performed at the third month of pregnancy. This was the fourth case performed in Washington within a short time by four different operators, and all recovered.

[1] Myomectomy During Pregnancy. Albert I. Stavely. [2] Ibid.

The second proposition is :

Labors presenting serious difficulty to delivery are best treated by abdominal section and removal of the child and tumor.

This rule does not apply to cases where the labor does not present any serious complications or where it can be readily terminated by forceps. Difficult and high forceps applications, version, labors complicated by malpositions of the child, irregular labor pains and slow dilatation present such serious features when caused by fibroids of the uterus, that the maternal and fœtal mortality is very great.[1] Surgical interference offers better chances for mother and child. Cæsarean section should not enter into consideration in this class of cases, owing to the frightful mortality[2] that has resulted. The disastrous result of closing the uterine wound when a fibroid growth exists in the organ is enough to banish it, besides the objection that if the woman should recover she will continue to have a diseased uterus.

The choice of method will rest between the Porro operation and hysterectomy. The Porro is permissible only when the tumor is situated sufficiently high to permit constriction of healthy, uninvolved tissue below it. The rapidity with which it can be performed may give it preference over hysterectomy when the patient is exhausted by prolonged labor.

Hysterectomy may be complete or supra-vaginal amputation. In suitable cases the latter is preferable. Fibroids situated low and involving the supra-vaginal portion of the cervix are better treated by complete hysterectomy. While preparing this paper I was pleased to receive a report of the case of Dr. Douglas, of Nashville, in which he saved the mother by operating as late as the third day of labor.

[1] Susserott collected 147 cases. Forceps was applied 20 times ; 8 maternal and 13 fœtal deaths. Version, 20 times ; 12 maternal and 17 fœtal deaths ; artificial extraction of placenta, 21 times, with 13 maternal deaths. In all, 53 per cent. maternal deaths and 66 fœtal. Nauss reports 54 per cent. maternal mortality and 225 labors.

[2] Phillips gives the maternal mortality 60 per cent. Leozin, referred to by Pozzi, gives 28 cases, with 24 deaths. Sanger, 43 cases, and only 7 mothers saved, a mortality of 84 per cent.

DISCUSSION.

Dr. A. J. Coley, of Alexander City, Ala.—I have enjoyed Dr. Fry's paper very much. His paper calls my attention to a lady whom I saw last summer who had a tumor of the uterus which seemed to fix all the pelvic organs deep down in the pelvis. She was suffering intensely, and it seemed for a long time that surgical interference would have to be resorted to; but the history of the case showed she had been regular in her menses all her life prior to her marriage, and that there was evidence of the pelvic growth for a year or more before she was married. With this history to guide me, and that since she became married her menses have ceased, I was inclined to believe that she was very likely pregnant as a complication, so I suggested that my friend, Dr. J. A. Goggans, be called in consultation. He agreed with me in my diagnosis. Now, this lady was suffering excruciating pains in her pelvis, and we thought that at first hysterectomy was the easiest and best way out of the trouble, for with the large tumor she had, situated on the left and low down on the uterus, if she was pregnant, she could never be delivered; but the operation was deferred from day to day until our diagnosis was confirmed by the movements of the child. We still watched the case with a great deal of care, and we saw, too, that with each visit the adhesions seemed to give way and the pains lessened, and she was soon delivered of a healthy babe and is now doing her household work. I am opposed to any surgical interference in these cases until all other means have been exhausted, for this was an extreme case in every respect. Her age was about thirty-five or forty years, with the fact before our eyes that her menstrual life would last from two to five years, and that all this time the tumor would continue to grow. It looked like her future was very short and that she was one who ought to be operated on. This, of course, meant to sacrifice the life of the child, if not the mother also. I had seen two such cases operated on, and both were unsatisfactory to me; so with but little to hope for in an operation we waited and were gratified at our delay. I am impressed that there is too much surgical interference with these cases, and I believe that the results would be better to leave them alone than to operate.

Dr. R. R. Kime, of Atlanta, Ga.—I have a case of interest to report in this line which occurred some two years ago in a debilitated woman with evidences of infection before labor. The pulse ranged from 110 to 120, intermitting 1 to 3 beats out of five. There was a growth in the posterior segment of the uterus, crowding the cervix uteri above the symphysis pubis, and it looked as though the patient could not be delivered without operative interference. By waiting and placing the patient in an exaggerated Sims position and elevating the growth we succeeded in delivering the child. After the delivery of the child there was some difficulty in delivering the placenta. The hand had to be introduced into the uterus and carried over the tumor, separating the upper third of the placenta from the upper border of the tumor, the lower two-thirds having separated from the corresponding part of the tumor. The most interesting feature was that after the delivery of the child, the infection having continued, the patient was treated as I usually treat these cases, by tubular drainage. The tumor entirely disappeared and the patient is to-day well, without any evidence of the infection.

Dr. Howard A. Kelly, of Baltimore, Md.—I agree with Dr. Fry in his conclusions, believing that they are important. At the same time, in going before the profession at large in a discussion of this subject of pregnancy in relation to fibroid tumors of the uterus, we cannot too strongly emphasize the point brought forward by Dr. Coley, that there is entirely too much tendency to interfere with pregnancy complicated by fibroid tumors. I have seen cases a number of times in consultation, and I have had several cases of my own where pregnancy was associated with the presence of fibroid tumors, and in most cases I have not seen any necessary indication for bringing on premature labor. In many instances a consultation has been the means of postponing operation. If the tumor or tumors are situated in the upper part of the uterine body, unless large and multiple they are comparatively unimportant. If situated in the lower part of the uterine body, and it is found as pregnancy advances that they can be pushed up, it is important to do so when labor begins, in order that labor may proceed normally. I have opened the abdomen three times, doing a myomectomy, in cases where the tumors interfered with pregnancy, so that the child's

head became fixed in the cervical portion of the uterus. All of these patients were normally delivered at full term. Interference is much more apt to be overdone than underdone. The tendency of the profession is to interfere too much in these cases, and I feel confident that, if allowed to go on, many of them would be delivered normally. Of course, cases that cannot be delivered normally should have an abdominal operation performed when the child is viable; never forget that there are two lives to be considered, and, if both can be saved, so much the greater is the triumph.

Dr. W. D. Haggard, Sr., of Nashville, Tenn.—In confirmation of what Dr. Kelly has said, I would like to report a case that came under my observation a few years ago. I was called in consultation to see a woman who was supposed to have a fibroid tumor of the uterus. Pregnancy was not suspected. However, when I was called I suspected there was pregnancy complicating the fibroid, and during the next two or three days it was thought that the woman could not be delivered at full term with the presence of this tumor. I was about to perform a hysterectomy, but before all the friends had consented to an operation the woman fell into labor and was delivered of a four-and-a-half-months' child. Peculiarly the tumor developed in the lower posterior segment of the uterus. I took occasion to watch the case after the delivery of the child. The woman had a good convalescence. I examined her from time to time. The first few days after the delivery the tumor was fully as large as an ordinary drinking-pitcher. Some weeks later I examined her again and imagined the tumor was smaller, and this led me to make an examination still later, at intervals of a month or so for five or six months, at the end of which time the tumor had entirely disappeared. I do not know whether it was the effect of pregnancy that produced the appearance of the tumor or whether it is possible that I was mistaken. I do not think I was mistaken about there being a fibroid tumor present, but I would like to know how it was that the tumor disappeared and pregnancy went on normally. It confirms what Dr. Kelly has said, that we should leave these cases alone when we think it is necessary.

Many years ago I was called in consultation with a physician

in this city to see a patient who was suffering with pains similar to labor. The next day a pedunculated fibroid had extruded, and the day following I removed a fibroid tumor by the *écraseur*, and the woman, either from my operation or from the manipulations that had been used in the examination beforehand, became septic and died. She was pregnant, because after removal of the tumor and during the next few days she aborted. She died from infection. She had been examined many times before I saw her, and possibly was infected then. However, I may have been responsible.

These are the only two cases that have fallen under my observation.

Dr. James A. Goggans, of Alexander City, Ala.—I want to thank Dr. Fry for bringing this subject before the Association. It is a very important one. While it is not so common among most country practitioners, perhaps when we do have a case of pregnancy complicated by fibroid tumor we should be able to give an intelligent answer and know how to manage a woman in this condition.

I have seen in the last twenty years, which is about the length of time I have been practising medicine, quite a number of cases, most of whom have aborted. I want to say I saw the case referred to by Dr. Coley with him. This woman had three tumors. She was seriously ill from pressure of these tumors. There was one on each side in the lower segment of the uterus, and the uterine tumor developed in the middle. It seemed as though these two fibroids—one on each side of the uterus—pressed down and were fixed tightly in the pelvis. The cervix was high up, and it was impossible for us to feel it. We advised against interference. I examined the woman two or three months afterward, and these tumors had been lifted out of the pelvis, the cervix had come down, and was presenting in the vagina. I gave it as my opinion that she would give birth to a child naturally. I believe that we should not precipitate hysterectomies in cases of this kind.

Dr. James McFadden Gaston, of Atlanta, Ga.—I have a somewhat peculiar case to relate in this connection of obstruction to the progress of labor from a tumor, but not a fibroid tumor. It was a dermoid. The circumstances were peculiar. The physi-

cian in charge of the case sent for me in the night at an hour that I was not accustomed to go out, and my son responded to the call. After arriving at the house there was no difficulty in finding a mass which completely occluded the vaginal canal, with the head of the child presenting. My son called Dr. George H. Noble, who, I believe, found that the obstruction was so great that it was utterly impracticable to undertake to deliver the woman by forceps, and he concluded to lessen the obstruction by aspirating the portion of the tumor in which he had detected some fluctuation. More than a quart of fluid was drawn off, which was reported to me as being of a grumous nature. This left space enough to deliver the woman, with forceps, of a dead child. This mass still remained in the pelvis, filled up again, became very dense, and my son, on visiting the woman later, found it was giving her so much inconvenience that he again aspirated it, and drew off some more fluid, and I suggested to Dr. Noble the advisability of something radical being done in the case. On making an incision into this mass, as Dr. Noble had anticipated, it was a dermoid cyst, with hair and débris contained in the cavity. The operation was done some three or four weeks after the delivery of the child. The woman recovered slowly, but is in a very good condition. Dr. Noble thinks that a more radical operation at the time was not indicated, not even an operation for the cleaning out of the cavity and getting rid of any septic matter that might be present and would be more likely to become absorbed. The discharge from the tumor was very offensive. After a time I interceded and proposed to wash out the cavity, and proceeded to do so with a solution of carbolic acid, and it has continued to be washed out since. The mass is gradually diminishing in size and the woman is able to get up and be around, but the mass that is still present will have to be removed either by the vagina or through the abdomen. I do not believe there is any probability of getting radical relief otherwise. Without the recourse to aspirating the tumor there was no probability that the woman could have been delivered of the child, because fruitless efforts had been made to use the forceps. There were obstacles to the descent of the head which could not have been overcome except by aspiration.

Dr. George A. Baxter, of Chattanooga, Tenn.—I would

ask Dr. Fry, in his closing remarks, to state whether in these cases of fibroid tumors involving much of the uterine substance he does not think that the dangers of post-partum hemorrhage are vastly increased. The only severe post-partum hemorrhage about which I was ever greatly alarmed in my life was in a case where I had at the time a large fibroid tumor complicating labor and interfering with the natural contraction of the uterine fibres. The placenta was delivered and the womb cleaned out, but the post-partum hemorrhage continued. It was finally controlled. I thought at the time I would lose my patient. I attributed the hemorrhage to the inability of the uterine fibres to contract. It seems to me this complication would always greatly endanger the life of the woman.

Dr. E. S. Lewis, of New Orleans, La.—As we all know, it often falls to the lot of some physicians to meet with a series of anomalous cases such as those that were reported by the essayist; while other physicians with probably equally as large experience will pass through life without meeting some of the complications that have been mentioned. In an experience extending over probably thirty-four years or more (for I might include my resident studentship in the Charity Hospital) I have never met with a fibroid tumor which justified interference before labor—that is, a fibroid occupying the lower segment of the uterus and impinging upon the pelvic cavity. Within the past year I have delivered two women having large fibroids—in fact, when pregnancy supervened after suspension of menstruation for two months I was unable for several months to determine the existence of pregnancy. The uterus then reached above the umbilicus. But the woman was pregnant, and I delivered her at term without any difficulty. Of course, I had to use instruments.

The other woman was the wife of a prominent attorney in our city, who had a very large abdominal tumor, I suppose the size of a six months' fœtus. She had been married for a number of years, although had no children, and at about the age of forty became pregnant. I was a little apprehensive about her case; but, inasmuch as the tumors occupied the upper portion of the body of the uterus, the trouble I had anticipated I thought would be rather due to infection or inability of uterine con-

tractions. But she was delivered naturally without the use of instruments.

In another of these cases there was post-partum hemorrhage, which is likely to occur for the reasons given by Dr. Baxter, and convalescence was rapidly established. In this last case, during the involution of the uterus the fibroids entirely disappeared. I have not examined her since, but her husband has told me that there is no abdominal enlargement visible to the sight or to the touch, so that on his statement I rely entirely. I can conceive that in case of fibroids situated in the broad ligaments or occupying the lower segment of the uterus, seriously impinging upon the cavity of the uterus, that hysterectomy would be inevitable. It has been my fortune to escape such cases.

Dr. Fry (closing the discussion).—I am very glad to hear favorable expressions of opinion of conservative work in the treatment of pregnancy complicated by fibroid tumors and permitting women to go to full term and trying to deliver them naturally.

The cases I had in the paper, the reports of which I did not read, exemplified very nicely the wonderful resources of nature in overcoming these obstructions. In one case there was a fibroid tumor complicating pregnancy, as large as my fist, anteriorly and low down, and after the woman had been in labor about nineteen hours and had well-marked labor-pains the fibroid worked itself up above the brim of the pelvis, the child came down and was delivered naturally.

In another case seen by Dr. Baer, of Philadelphia, when the woman had been pregnant for two or three months a swelling or tumor was noticed in the abdomen. It was found to be a fibroid on the right side, attached by a loose pedicle. On further examination he found a large, intraligamentous fibroid low down on the right side, blocking up the right half of the pelvic cavity entirely. The lady moved to Washington to live, and the case was referred to me by Dr. Baer. I have been watching her this summer and noticed that the growth, which until about two weeks ago had entirely filled the right half of the pelvic cavity, had entirely disappeared. The woman had reached the eighth month of pregnancy. The tumor had become intra-abdominal and the child's head sank down in the pelvic cavity,

and on the twentieth of this month I believe she will have a natural labor.

In another case I was called to see, the woman being advanced about six and a half months in pregnancy, there was a large interstitial fibroid. She was suffering very acutely with pain in the hip. On vaginal examination I found the child impacted in the pelvic cavity and held very tightly there. I could not make any impression on it by pressure. The os was displaced backward and high up, so that I had to push behind the cavity to reach the cervix. Her suffering was so great that it seemed absolutely necessary to do something to afford relief. I therefore opened the abdomen and found the uterus enlarged by the interstitial fibroid. There was a broad band of adhesions, two inches wide, that was attached posteriorly to the corpus of the uterus, and it was that which held it down, preventing the ascent of the womb during the growth of the organ, and had impacted the child in the pelvic cavity. These adhesions broke loose during my manipulations, and the uterus immediately raised in the abdominal cavity. The trouble was overcome. I closed the wound and the woman got well without any untoward symptoms. On making a vaginal examination I found that the impaction was overcome, the woman went to full term, and was delivered naturally.

One of the serious complications of labor under these circumstances is post-partum hemorrhage. I mentioned the case of a lady whom I confined, and I did not know she had any trouble of this kind. After expulsion of the placenta there was profuse hemorrhage. I introduced my hand and found a submucous fibroid, situated posteriorly. On cleaning out the uterus and using intrauterine pressure I failed to control the hemorrhage. Finally I controlled it by introducing an iodoform-gauze pack. The woman recovered. Post-partum hemorrhage is one of the complications we have in connection with labors complicated by fibroid tumors. The hemorrhage is usually free if the placenta is attached at the site of the fibroid tumor.

Another complication is retention of the placenta. Twenty-one cases of artificial extraction of the placenta have been reported, and of this number thirteen died as a result of sepsis.

Another point I should be glad to have emphasized is this:

recognizing that pregnancy may go on and labor may terminate naturally and satisfactorily in these cases, we ought to discountenance the induction of abortion, which is spoken of now in recent text-books on gynecology as being the proper thing to do in the early months. A great many of the cases will go to full term and be delivered naturally. If we find at full term that operative measures are necessary, I would emphasize the fact that Cæsarean section ought not to be performed. The mortality from this operation in this class of cases has been disastrous, as high as 84 per cent. The best thing to do would be a hysterectomy, either complete or supravaginal.

I saw an interesting case of Dr. Kelly's which I thought he would mention, but which seems to have escaped his memory when he spoke on this subject. It was a case of fibroid tumor complicating pregnancy and blocking the left half of the pelvis. I believe it was intraligamentous and low down. It was very near the termination of pregnancy. There was no indication or possibility that the child could have been born through the natural passages. I received an invitation from Dr. Kelly to witness the operation. He opened the abdomen, incised the uterus, removed the child, then enucleated the tumor, and did a supravaginal hysterectomy. The woman recovered and the child is alive. If we get these worse cases, where surgical interference is demanded, I think we should resort to a supravaginal hysterectomy, and in a few cases a Porro operation, provided the constriction can be placed sufficiently low to get below the tumor and have healthy uterine structure.

UTERINE DRAINAGE AS A FACTOR IN THE PREVENTION AND RELIEF OF PELVIC INFLAMMATION.

By R. R. Kime, M.D.,
Atlanta, Ga.

He who prevents or relieves disease without removal of useful organs is a greater benefactor to mankind than the one who sacrifices such organs because of his inability to restore them to their normal functions.

When we consider how frequently removal of the tubes and ovaries, even the uterus itself, fails to relieve the patient to the extent desired, that she thus encounters the risk of death, intestinal adhesions, hernia, various varieties of fistulæ, ultimately lessened sexual power, sterility, and the various mental and nervous phenomena that accompany such operations, it is time we study preventive gynecology as well as preventive medicine.

It has been estimated that 50 to 60 per cent. of diseased tubes and ovaries requiring removal are due to infection after abortion or labor, and that 25 per cent. are due to gonorrhœal infection. If these statements approximate the truth, then I need not apologize for presenting so trite a subject as uterine drainage before such an assemblage as this, especially when I feel that it is one of the most important factors in the prevention and treatment of pelvic inflammation.

When and how to drain in abdominal work has been a vexed question, and called forth much discussion in the last few years.

Vaginal work is fast solving the question, and with the aid of the microscope it is hoped more definite results will soon

be formulated. Vaginal work has also aided materially in the solution of uterine drainage.

We have two varieties of uterine drainage which may be utilized to a greater or less extent in three classes of cases:

1. In endometritis, metritis, sterility.
2. Incomplete abortions with infection.
3. Puerperal infection.

Capillary drainage is secured by gauze or wicking; tubular, by the use of soft-rubber, hard-rubber, or aluminum drainage-tubes properly constructed. The gauze tampon and cervical stems or plugs as usually constructed and used do not drain the uterus efficiently. Gauze or wicking when properly used drains off liquids only, not germs, cellular elements, or débris. When used as a tampon it acts, as its name implies, to check, obstruct, or fill up. It is packed in the abdominal cavity to check hemorrhage, hence obstructs, and especially so in the uterine cavity.

We have important factors that interfere with gauze drainage that are inherent to the uterus itself:

1. The uterine cavity is increased or diminished by contraction or relaxation of muscular tissue in the uterine wall.

2. The cervix or internal os, the outlet of the cavity, is small, and frequently made smaller by contraction of the circular muscular fibres or obstructed by flexion.

3. The uterine cavity is a normal cavity and not an abnormal one made by destruction of tissue that requires to be filled up by granulation or new formation of tissue.

4. When the uterus is tamponed the material acts as a foreign body, stimulating uterine contractions when there is sufficient vitality of the organ, thus crowding the gauze down into the os and cervical canal, plugging the cervix and obstructing and checking drainage.

We all know that when gauze is constricted in the cervical canal it cuts off drainage, and yet physicians will pack the gauze tightly into the uterus and cervical canal, then placidly wait for drainage, while the septic germs march bravely on, invading new territory and destroying vital forces of the

patient. It is argued that the gauze will absorb the discharges, yet, almost invariably after curetting, the gauze tampon is saturated with blood before the dressing of the patient is completed. In point of fact, the gauze is often saturated with blood as fast as introduced into the uterine cavity, and in a few hours the vaginal portion is coated with mucus, while the uterine portion is forced into the internal os, plugging it and cutting off capillary drainage.

In the first and second class of cases referred to above in which the gauze tampon is used, who has not seen elevation of pulse and temperature, due to obstruction by the tampon, relieved as soon as the gauze is removed? In such cases its removal will be followed at once by pent-up discharges, increased drainage, and relief of unpleasant symptoms. The good effects of a tampon used after curetting in the first and second class of cases is not so much due to drainage as to its effect in checking hemorrhage, stimulating uterine contractions, prolonging applications to endometrium, and acting as a surgical dressing.

In cases of sterility with small flexed uterus and conical cervix, the gauze tampon has its advocates; but then a few days after dilatation and curetting a cervical or uterine drainage-tube is more beneficial. Not such cervical stems as are generally used, for they obstruct drainage and frequently injure the fundus of the uterus, but one so constructed as to give free drainage which cannot be affected by contractions of the cervix, or become occluded by encroachments of the cervical mucous membrane or endometrium; neither should it extend to the fundus, producing pressure or irritation. The uterine end should have plenty of large velvet-eyed openings, cervical portion without openings, with as large channel as it is possible to secure, making a very thin shell. These tubes are made in three sizes, of hard rubber, by the Davidson Rubber Company, the smaller size being used in these cases. It acts as a stem, tends to straigthen the uterus, stimulates its development, and at the same time gives free drainage.

In these cases and in endometritis with spasmodic contrac-

tions of internal os, requiring repeated dilatations to secure proper drainage, the use of these tubes obviates the necessity for repeated dilatations and at the same time allows free drainage, thus relieving many cases before tubes and ovaries become involved.

Every gynecologist finds many cases of endometritis, diseased tubes and ovaries, due to abortions improperly treated. These cases can almost invariably be prevented by appropriate treatment at the proper time.

Ninety per cent. of cases of infection after abortion are putrid and not septic infection. Prolonged absorption from putrid infection will produce pelvic complications, but in these cases, if the uterus is emptied early by any practical method, disinfected, and drained, they will recover.

The gauze tampon in these cases should only be used to check hemorrhage, prolong disinfection of endometrium, and stimulate uterine contractions. These results will be accomplished in from twenty-four to forty-eight hours, then the tampon should be removed, *after which the uterus will usually drain itself.* If the tampon is left longer it will obstruct drainage, produce constitutional disturbance, increase the risk of pelvic inflammation, set up irritation, increase absorption, with a possibility of infectious material being forced out into the tubes.

In septic infection the dangers are greatly increased, the course more rapid and disastrous, with pelvic complications more common. In these tubular drainage is the most essential factor, as it is in cases of infection after labor. In infection after labor the order is reversed, the greater majority are cases of septic or mixed infection; this difference is due to the fact that but few cases of abortion are handled or examined until infection occurs, except where the uterus is completely emptied, hence not infected by the physician, midwife, or nurse, but have simple decomposition of uterine contents. Not so with cases of labor, for the majority are handled or examined at the time of labor by the physician, midwife, or nurse, and the uterus more completely emptied; beside the

uterus is much larger, more flabby, and the cervical and vaginal canals more patulous, all of which favor infection, more rapid absorption, with a greater liability to invasion of other organs and tissues.

At full term the involution of the generative organs requires a greater retrograde tissue metamorphosis, increased action of lymphatics and bloodvessels.

Nature also establishes at this time a process of elimination and drainage, throwing off noxious waste material known as the lochia. Plug up the cervix and compel the uterus to take up or retain this effete matter, and what is the result? Add to this condition septic infection with consequent germ development, migration, and absorption, and behold the result!

If this is not ruin and devastation sufficient, take a curette and invade the uterine cavity, break down and tear up nature's barriers and protections against germ invasion, open up as much raw surface as possible, adding traumatism so as to increase absorption, and, for fear the germs, toxic material, dead leucocytes, and débris may chance to get away, stuff the uterus and cervical canal with gauze, and if the patient recovers it may be said she recovered in spite of the treatment.

It is useless to talk about removing all the germs and septic material from the uterus by use of the curette in cases of true septic infection. It is also equally as absurd to expect a gauze tampon to efficiently drain such a uterus. Even its most ardent advocates advise changing the tampon once in twenty-four hours if drainage is desired. I care not how expert the operator may be he cannot remove and replace a gauze tampon every day in cases of puerperal septic infection without doing damage to the endometrium and injuring nature's process of repair, thus producing traumatism and irritation by the manipulation.

Free unobstructed drainage is the most important factor in the treatment of these cases.

Make a free open channel from the uterine cavity, keeping it clear, and nature will soon establish a current of elimination which not only unloads the endometrium of noxious material,

but extends its power of elimination outside the uterine body itself by utilizing the bloodvessels and lymphatics. To quote from a former article: "Nature establishes a system of sewerage, the main channel or trunk being the uterine cavity, with the cervical and vaginal canals, while the bloodvessels and lymphatics form the tributaries." Yet we are advised to fill the uterine cavity with gauze, damming up nature's channel of elimination, preventing the throwing off of effete material from placental site, endometrium, lymphatics, etc., obstructing the egress and retaining the dead leucocytes ladened with germs and toxins, annulling phagocytosis, producing the very condition we should endeavor to prevent. Free drainage in these cases can only be attained by use of the drainage-tube.

In severe cases, if desired, capillary drainage may be added by carrying a strip of gauze up into the uterus with the drainage-tube, but not a tampon. This gives ideal drainage, and will drain any uterus in any position by changing the patient from side to side in bed.

After ten years of practical use of the drainage-tube in these cases, I am more fully convinced than ever of its utility, not only in the immediate relief of the infection, but in its power to relieve and prevent involvement of the tubes, pelvic peritonitis, pelvic cellulitis, lymphangitis, and even phlebitis.

I will not worry you with the reports of cases, but will say I have drained several cases with pelvic complications, such as salpingitis, pelvic peritonitis, lymphangitis, even phlebitis, in some cases with abundant inflammatory exudate, which were relieved, the exudate absorbed, and the patients are well, without sacrificing any of the generative organs.

These remarks apply more particularly to cases of true septic infection and not putrid infection, for the latter will usually get well if the uterus is cleaned out by any method, disinfected, and even tamponed.

When once the drainage-tube, preferably of soft rubber, is given an impartial trial in cases of puerperal septic infection, coupled with the use of salines, thus draining the ali-

mentary canal, many lives as well as uteri, tubes, and ovaries will be saved.

The largest-sized tube the cervix will admit ought to be used, and, if constructed of hard rubber, of similar pattern to the ones presented, the uterus can be irrigated through the tube, without its removal, by using a long metal or soft-rubber catheter of small size. Such irrigations should be of mild antiseptic solutions or simply boiled water, as harm is frequently done by repeated washing out of the uterus with strong antiseptic solutions. Soft-rubber tubing is more satisfactory for draining the uterus in cases of septic infection when properly constructed and placed. For its use, see *New England Monthly Medical*, August, 1896.

In conclusion I would say:

1. A uterine tampon is not a true drain, and even obstructs drainage in many cases.

2. Capillary drainage is secured by carrying a strip of gauze up into the uterine cavity, not packing it, and then it drains for a few hours only.

3. Gauze cannot even act as a capillary drain when either end or centre is constricted, or when coated with mucus.

4. Gauze when saturated with serum, unless it contains an antiseptic, forms a hotbed for germ development.

5. Never tampon the uterus in puerperal septic infection, except to check hemorrhages.

6. The good effect of a gauze tampon in cases of endometritis and after abortion is not due to drainage, but to its effects as a tampon—*i. e.*, checking hemorrhage, stimulating uterine contractions, prolonging medication of the endometrium, and acting as a surgical dressing.

7. The uterine drainage-tube is the most essential factor in the treatment of puerperal infection, and the best method of securing drainage when demanded in other diseased conditions of the uterus.

8. It will save more lives, relieve and prevent more pelvic complications than any other one factor at our command.

DISCUSSION.

Dr. J. Wesley Bovée, of Washington, D. C.—Mr. President: I agree almost entirely with what the essayist has said regarding gauze drainage, and I use it only in cases of curettement where I do trachelorrhaphy, and I think the operation on the cervix will produce a temporary congestion sufficient to close the cervical canal for a few days. In these cases I use the gauze for twenty-four hours, simply to prevent to some extent the closure of the cervical canal for that length of time, at the end of which time the gauze is removed and a canal is left which will permit drainage. There is no doubt in my mind but what in cases in which we use drainage following curettement, if the gauze is left in forty-eight hours and removed, there is following a discharge of two or more ounces of serous fluid. We notice it coming out at the cervix, as a rule, with gauze. The gauze does not drain well after the discharge. I used drainage-tubes in this manner formerly, and found in many cases it caused a good deal of trouble in the way of pain, and so forth, and I wondered whether it was proper treatment to use an open drain in the cavity of the uterus, and trust to non-infection through the vagina. I did it somewhat, and it does seem to me in most cases of abortion there is a sufficient opening through the cervical canal for drainage. If there is a displacement of the uterus, if the uterus is small and flexed, we will not have so good drainage, and I have tried to obviate that by placing the uterus in proper position by the use of tampons posteriorly of gauze in the vagina or anteriorly, if necessary, if the uterus is anteflexed. Sometimes in these cases I have inserted gauze for a short distance without doing trachelorrhaphy; but if there is fixation of the uterus it is a dangerous procedure to curette the uterus without freeing it.

So far as curettement of the uterus goes in septic cases, I think it is justifiable in cases following abortions where there is a free opening of the uterus. Where we have beginning evidences of septic infection before many days, say the first twenty-four hours, gentle curettement with a dull curette, not scraping off much of the tissue, but simply its outer coating, as when

cleansing the cavity of the uterus, is very effective in these cases. But a more thorough scraping opens up new avenues for the penetration of septic material into the surrounding tissues. The septic infection following abortion usually travels through the lymphatics, going through the broad ligaments in that direction, not so often into the Fallopian tubes, so that it does occur in many instances in that way.

The drainage-tubes which have been exhibited by Dr. Kime would give ample drainage, but whether we would be sure of keeping the vagina sterile during the time the tubes are in the cervix, and in that way prevent the passage of the septic germs into the uterine cavity, I do not know.

Dr. Howard A. Kelly, of Baltimore, Md.—I have enjoyed listening to the conclusions of Dr. Kime with regard to uterine drainage, which seem to me to be eminently rational. But I have had a very limited experience with uterine drainage. I took it up at one time, when Dr. Polk first advocated it, but I feel that I have not faithfully tried it. It is my custom to curette and let the uterus drain naturally into the vagina on dressing, and sometimes without dressing. I should be interested to know the practice in the Woman's Hospital in New York, as I understand one of the members of the surgical staff there advocates the use of drainage and has devised little metal tubes for that purpose. Perhaps Dr. Haggard can tell us something about it.

Dr. W. D. Haggard, Jr., of Nashville, Tenn.—I can say that as a uterine drain the device to which Dr. Kelly refers—the Outerbridge stem—drains admirably. It is simply a wire contrivance bent in such a shape as to hold the cervical canal patulous. There is no possibility of its being clogged, and it keeps the canal in that degree of patulency to which it has been divulsed. It is not a tubular stem patterned after the one of Dr. Kime or Dr. Wylie, but simply a wire frame cervical tent.

In reference to the practice of other surgeons, you all know that Dr. Emmet does not curette as a routine practice before other plastic work. He never does two plastic operations at the same sitting. He never curettes when he operates on the cervix, either the operation for restoration of the tear or the operation of amputation, which was also devised by him.

Talbot's stem, I understand, is only seen in the Woman's Hospital, as it was devised and used by Dr. Talbot, an assistant surgeon. It is a gold-plated, spiral tube, and drainage is effected between the apertures. They are very likely to clog, and were removed whenever the temperature rose. It is unnecessary to say that we looked on these cases with a great deal of anxiety, and Talbot abandoned this tube because it did not drain.

You are doubtless familiar with drainage by the aluminum tube of Professor Gill Wylie. It has a longitudinal slit, as well as a distal aperture, and there is no question about its draining. With reference to gauze, I have frequently observed that when the gauze is pulled out there is a flow of serum or of bloody fluid following it, that was dammed back in the cavity of the uterus. If you pack the uterus tightly the outside layers will be infiltrated with plastic effusion, which absolutely prevents capillarity, whereas the inside of the gauze will be perfectly sweet and clean.

Dr. Kelly has struck the keynote of drainage of the uterine cavity when he depends upon the divulsion. Shortly after the cervix is dilated and the uterus curetted it can take care of itself. The uterus drains itself of its physiological contents, and we can depend upon its draining after it has been thoroughly divulsed.

Dr. Charles P. Noble, of Philadelphia, Pa.—I am in accord with most of the conclusions given by Dr. Kime in his paper, but my own experience is that I do not drain very much. From the beginning of my work I used gauze drainage, some years before Dr. Polk advocated it as a systematic procedure. I found, what many others have since, that instead of draining, the gauze simply dammed back the secretions, so I had abandoned its use before it was advocated by Polk. I feel that in the non-puerperal cases we can depend upon the uterus to drain itself. I have seen no trouble from this practice, and I think it is sound. As to using any tube, I have never had any experience, and therefore my opinion would be theoretical. It seems to me, however, that as the uterus is drained satisfactorily without any tube, there is no great indication for using it, and we know that it is only in exceptional instances that there are germs in the uterus itself; but, as a matter of fact, they are always present in the vagina, and we run the risk of infecting the en-

dometrium by using a tube or any drainage apparatus which will bring the vagina in contact with the endometrium. In puerperal cases I have used gauze for a short time. In these cases it has one advantage—that is, if a considerable quantity of gauze is packed in loosely, if there has been any débris left in the uterus after curetting and washing out the cavity, when the gauze is removed it will favor the removal of more or less débris, and I have used gauze in puerperal cases in this way.

Dr. Joseph Taber Johnson, of Washington, D. C.—I can hardly add anything to what has been said except to emphasize a fact from another standpoint—that gauze drainage cannot be depended on under the circumstances mentioned in the paper for draining the uterine cavity. I have had the same experience that others have had in the use of gauze drainage, finding subsequently that patients would have pain and chills, and on removing the gauze a tablespoonful of bad-smelling fluid would gush out and the patient would at once begin to get better. One of the main points which the doctor brought out in his paper has not been mentioned in the discussion—namely, the prevention of more serious trouble by this early treatment of the uterus. I am certain that a good deal of trouble can be prevented by the treatment Dr. Kime has so well described. The use of these tubes is good in some cases. In still others the objections urged by Drs. Bovée and Noble would be very strong ones, in that the tube would keep open a direct communication between the germ factory, so to speak, in the vagina, and in the interior of the uterus for the transmission of germs. I have been in the habit of using tubes of this kind for quite a long time. They were given to me by Dr. Hanks, of the Woman's Hospital in New York. These tubes were very much like the one passed around, except that instead of there being holes in the side there was a long slit on each side, and they were expected to drain through these. I use them more especially for the purpose of keeping the uterine canal patulous after dilatation for the relief of dysmenorrhœa and sterility. We get excellent results from this kind of drainage-tube. It will help to keep the uterus straight where there was flexion in the canal, and it will also keep the canal from contracting. I have had excellent results from these tubes in keeping up the dilatation

and preventing contraction, where the operation was done for the relief of dysmenorrhœa in young women, who suffered such torment and agony at their menstrual period as to make some kind of operation necessary. I have had a number of cases of return of dysmenorrhœa after dilatation before I began to use this tube for the purpose of keeping the canal straight and patulous. By keeping it in for a week or ten days in cases where the patient was willing to stay in bed that length of time, I have had much better and more lasting results.

With reference to its use after abortion and parturition, I do not think the tube is large enough. The neck of the uterus will admit the end of the finger in these cases where there is sepsis.

Dr. James A. Goggans, of Alexander City, Ala.—It seems to me when we divulse the cervical canal and leave it to nature for drainage, we have done the greatest thing we can do under the circumstances. The vagina is nearly always more or less invaded by germs, and it seems to me the less we put in the vagina of things that might serve for conducting germs into the uterine cavity the safer it is for the patient.

As to the use of the curette in puerperal cases, I do not think we ought to use this instrument for the purpose of removing the mucosa. It should be used for the purpose of removing the dead placental tissue or anything of that kind. I usually resort to irrigation after using the curette, and then leave the uterus to drain itself naturally. After infection has taken place I believe it is utterly impossible to drain the septic material from the blood; nevertheless, I think we should resort to drainage under all circumstances, lest more septic matter may be absorbed. I desire to cite here the fact of some experiments that were made by Professor Thompson, of Rome, Italy. He resorted to the experiment of showing how septic matter could invade the lacunæ of the perineum, the uterus, and the peritoneum, even as high as the diaphragm, by injecting indigo solution with a syringe in the perineum of the cadaver.

Dr. F. W. McRae, of Atlanta, Ga.—There was one point brought out by the doctor in his paper that has not been alluded to in the general discussion, and that is with reference to washing out the uterus after an ordinary curettement or in post-abortion cases. It seems to me that these case have done better

in my experience by simply swabbing out the uterus with gauze than when I have washed it out with any antiseptic solution or even with sterile water. In the last series of cases that have come into my hands I have curetted and swabbed out the uterus with gauze, using no washes whatever, and they have done better. I believe Dr. Kime takes that position, but it has not been alluded to in the discussion.

Dr. Henry D. Fry, of Washington, D. C.—There is one point I would like to mention. Dr. Bovée has spoken of it incidentally. It is most important—namely, efficient drainage in puerperal cases. The consensus of opinion of those who have expressed themselves this morning is against the use of gauze as drainage. It has its value for hæmostatic purposes. If we curette the puerperal uterus or a uterus any time after a miscarriage, we are very likely to separate some blood-clots in the sinuses and produce a severe hemorrhage. It would be unsafe to curette a case of that kind without having gauze at hand in order to insert it to control hemorrhage, and then at the end of twenty-four hours the gauze can be removed and the uterus washed out. If we have a septic condition with fever, we know that in those cases a drainage-tube is unnecessary, because we will always have a patulous cervical canal. The drainage of the uterus will be perfectly free and efficient, provided the organ is not displaced. I have reported at another time cases of inefficient drainage under these circumstances that were due to displacement of the uterus. It is an important condition to be remedied where we have had bad drainage in a puerperal uterus. Until the sixth or eighth day the uterus is too large to become displaced, at least it is too large for posterior displacement. By that time involution has taken place sufficiently for the uterus to fall back under the promontory of the sacrum. I have seen fever following childbirth, not until the eighth or ninth day, due to retroversion of the uterus, and as soon as the uterine cavity was washed out the fever stopped for four or five days. Then there was reaccumulation of the lochia and a return of the fever, and this condition will keep up unless we correct the displacement of the uterus. There is no use for tubes in draining the puerperal uterus. The only condition in which I would use drainage-tubes at all would be in the cases referred to by Dr. Johnson for the relief of dysmenorrhœa and sterility. I think they are of

value in those cases, not so much for drainage purposes as for the condition he has mentioned—namely, keeping the canal open, and there will be less danger of subsequent contraction of a canal treated in that way than there would be in one which you simply dilate and use nothing to keep it open.

Dr. Kime (closing).—From the discussion we seem to be in accord on most all points. Those who followed the paper closely will find on rereading it that I do not advise the insertion of this small stem immediately after curetting for abortion. I said where a tampon was used after curetting for abortions that after you remove the tampon, as a rule, the uterus would drain itself. But here comes the point as to the use of the small tube. After endometritis and sterility with flexion, every gynecologist who has done this work knows that in a week or ten days the patient comes to his office, and if he undertakes to examine the internal os and go into the uterine cavity he will find that the internal os has recontracted, and especially so in cases of painful menstruation and of sterility in young women, and that a great many gynecologists repeat the dilatations from week to week at the office. I advocate the use of small-sized tubes for the purpose of keeping the internal os patulous. Not only that, I have met with a few cases where it was necessary to repeat the curettement. In those cases in which you have first used the tampon, and have gotten free drainage, if there is a tendency to return of the disease, then it is necessary to keep the os patulous and uterus drained so as to prevent the endometrium from being so diseased as to require a re-curettement.

With reference to the size of the drainage-tube to be used. Ordinarily in these cases I use a small tube, and I find we do not need one any larger. Every case of septic infection after labor requires a large tube, and its calibre should be at least half an inch in diameter to get free drainage of the uterine cavity. *As a rule, I use a soft-rubber drainage-tube in preference to anything else.*

There is no question about tubular drainage in septic infection. I have seen time and again cases that had been under the care of other physicians which developed serious trouble, such as diseased conditions of the tubes and ovaries or of the lymphatics and bloodvessels, in which this method of drainage has acted

admirably, because tampons have been removed and proper-sized drainage-tubes substituted with excellent results. It has been stated that "a septic uterus with a relaxed os will drain itself." As an evidence that such is not the case, I will refer here to one case only. I saw a woman ten days after labor, found the os sufficiently patulous to admit two fingers, yet on introducing a dilator into the cervical canal to keep it open, the septic material ran out into the vagina, filled the speculum, and then ran out into the tube beside the bed. I have seen approximately the same condition in other cases. In this case the uterus was washed out and a drainage-tube inserted. The temperature at the time was 106½°, with a pulse of 140 or 150, and it looked to me as though the patient would die in spite of everything that could be done for her; but by establishing free drainage, eliminating the débris from the uterus, the patient got along very well. I also secured free drainage from the alimentary canal by use of salines. In a short time the temperature and pulse were normal. I took out the drainage-tube, and in less than forty-eight hours thereafter the temperature reached 104° F. I put in the drainage-tube, and in a few days the temperature was normal; then it was removed, leaving a strip of gauze in the cervical canal, but the temperature rapidly raised again, so the drainage-tube was replaced and used until temperature and pulse were normal several days. The patient recovered without permanent impairment of tubes and ovaries, although they were involved at the onset of the attack as well as an abundant inflammatory exudate being present.

If you had used these tubes as I have used them for ten years or more, even with diseased conditions of the Fallopian tubes and inflammatory deposits about the uterus present, and had seen the good effects of the drainage-tube in lessening the temperature and bringing down the pulse without the use of coal-tar derivatives, I feel that you would have the same confidence in the drainage-tube that I have.

Operations, even hysterectomy for these cases, have been discussed on this floor, yet I am confident that proper drainage and elimination by tubular drainage for the uterus, and salines for the alimentary canal, will save more patients, preserve the generative organs for future usefulness and leave the surgeon's conscience more at ease.

A NEW SPLINT FOR FRACTURES OF THE SHAFT OF THE HUMERUS.

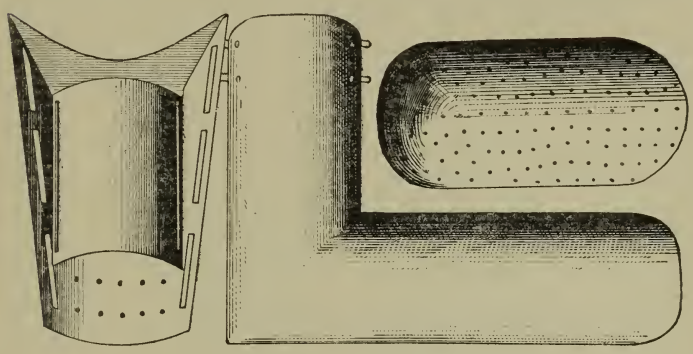
By George A. Baxter, M.D.,
Chattanooga, Tenn.

I desire to present to the Society to-day a new device for fractures of the shaft of the humerus at or below the surgical neck. In doing so I am aware of the great number of devices which others have constructed for the same purpose, and that every conceivable principle for extension, counter-extension with retention, all of which principles are necessary here, have been tried. Hence I claim no new principle, but a new combination which I trust will prove effective in these the most difficult fractures in the body to handle with a certainty of good results. That I am not alone in the last-expressed opinion is evidenced by the fact that about one-third of the ununited fractures of the whole body are found in this bone within the limits which this splint is intended to cover.

Whatever may be said of the causes of such result, incident to the attachment of so many large muscles causing displacement; the interposition of muscular tissue between the fractured ends; the want of perfect fixation of the shoulder or the rotary motion given to the lower fragment by slight motions of the forearm, the obstacles usually ascribed as causes for the large proportion of failures in these fractures, all of which can readily be admitted, it is apparent from these very statements also that most of the devices in use are defective in some respects in maintaining the principles involved—extension, counter-extension, and fixation—or such would not have been the result. It was, then, with a spirit of hesitancy and doubt that I set myself to accomplish some-

thing better than had been attained by so many surgeons more worthy of the task than myself. In explaining the result the Society will pardon me if I review my course of reasoning, as I can better explain my device in this way.

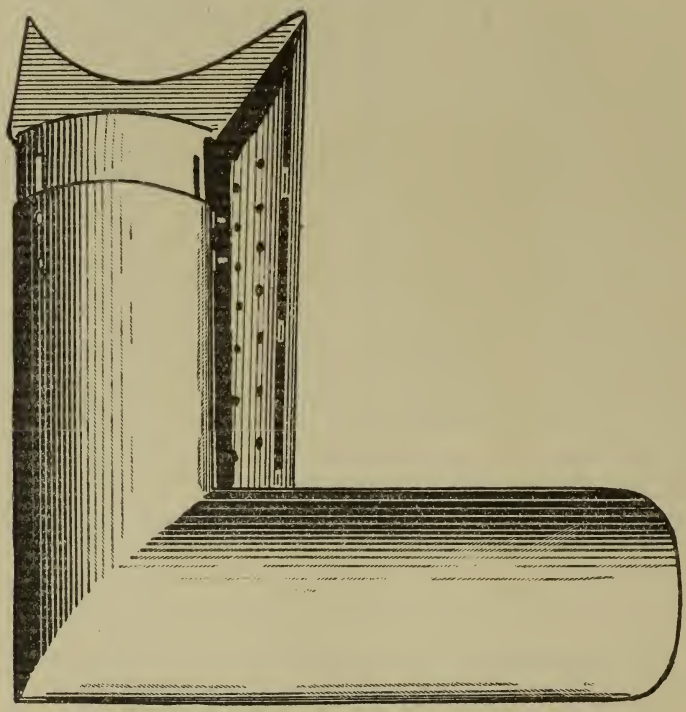
Fig. 1.



In doing so, I went back and asked myself plainly, where is the most natural point of *counter-extension*, and where the most natural *point of fixation for extension?* And the answer came readily: The axilla for counter-extension and the lower expanded head for extension. These points must necessarily have occurred to others; why, then, their failure and abandonment? In the axilla, unquestionably from pressure upon the nerves and vessels. The cripple bears the weight of his body upon his crutch-head, and this is more force than we need—how? The study of the uses of a crutch brought the solution to this point of our problem; the weight here is borne not upon the vessels and nerves, but by the muscles in front of and behind the axillary space, and does not press upon the vessels at all. We could, then, by pushing upward in the same manner as a crutch obtain a point of counter-extension for any degree of force necessary, but the device, whatever it may be, should be made broad enough to find resistance against these muscles rather than in the axillary space. The next point, this determined, was the fixation of the shoulder.

The difficulty here was found to be twofold: The methods in use with the shoulder-cap and a pad in the axilla pushed the shoulder down and prevented it rising, but it was imperfect because there was nothing to fix it against when it was pushed down any more than there was in its unconfined position, for the internal splint when used, as it sometimes was instead of

FIG. 2.



a pad, did not extend sufficiently high in the axilla to do this, and shoulder-cap, shoulder, and internal splint all went down together. The second difficulty was a certain degree of rotary motion given to the fractured end of the lower fragment by the slight movements of the forearm and hand, greatly exaggerated by the length of leverage at the point of fracture. To overcome these two difficulties it was necessary that the

internal splint, if used, should not only extend against the muscles (for counter-extension), but that it should be firmly fixed, that the movements of the shoulder could be controlled by a shoulder-cap over the shoulder, pressing it down against this, which would prevent it being pushed too far downward or upward. I found that this could be thoroughly accomplished by uniting the crutch-shaped expanded head of the internal splint to a side chest plate, which latter could be held firmly in its place by straps passed over opposite shoulders

Fig. 3.

and around body. I also found that using the internal angular splint, fastened in this way in axilla to the shield, all motion could be avoided, rotary as well as other, by fixing the arm to the side by second roller of Desault and hand-sling. It simply remained then to provide fixed extension, and for this purpose I have adopted the slot and screw method of extension in the course of the internal splint.

I will now proceed to a practical application of the splint in your presence. The shield is first applied to the side, well pressed up toward axilla and firmly bound over opposite

shoulders and to chest-wall in this position. The arm hanging downward in the grooved internal angular splint is bent at the elbow, the forearm laid within its grooved portion of this splint and bound by spiral reverse bandages from wrist to elbow, which is fixed firmly at elbow by figure-of-eight, the whole internal splint having been first well padded; the extension and reduction is now made by pulling directly downward in straight line from shoulder, the internal splint lengthening with the pulling by the sliding of the screws

FIG. 4.

in the slots until a proper adjustment is made; *the screws are tightened* which holds the arm in full extension as placed. A moulded shoulder-cap is placed, the bandage carried up the arm, fixing shoulder-cap in usual manner. A small pad is now placed between the internal splint and chest shield, the arm fastened to side by second-roller of Desault, and hand supported in sling, which completes the whole. You will now examine and find by inquiry that though the shield is fastened as tight as could be drawn (more force in

this respect was used than was necessary for purpose of demonstration) that there is no numbness in fingers. You will see there is no interference by pressure with vessels, and you can use any degree of violence in movement, as I do now, without disturbing the shoulder or producing pain; and, finally, you see that the upper arm is in full extension down-

Fig. 5.

ward in straight line and held firmly there; in fact, that arm, shoulder, and body are as firm as though they were one solid piece. Theoretically, then, it fulfils all the indications, and in this demonstration upon an unbroken arm it does the same. I trust it will act equally well when put to the practical test by others in future, as I have found it in a recent case myself.

DISCUSSION.

Dr. James McFadden Gaston, of Atlanta, Ga.—Mr. President: Dr. Baxter spoke to me in regard to this splint, and showed it to me. I told him that probably while he was original in his design, and he undoubtedly is, the question of priority

would be brought to bear upon his apparatus. Before the Medical Society of Georgia, about six or seven years ago, at a meeting which was held in Atlanta, I presented a splint for fractures of the humerus, with the upper extremity crutch-shaped and angular at the elbow, coming down to the hand, and describing the particular indications in the case in which it was to be used for extension and counter-extension, with the projections so as so as not to exert pressure upon the axillary vessels and to adapt the splint to the length of the limb on the sound side. At that time I thought I was entirely original in having invented this splint, and the priority which I claimed was with reference to extension and counter-extension. But afterward, when I presented the splint before the American Surgical Association and investigated previously the probability of its having been anticipated by some other physician, I found in Hamilton's book on *Fractures*, published in 1860, a description of the screw and ratchet apparatus by which extension and counter-extension were made in the brachial limb of this splint, and the crutch-shaped support above accomplishing the object I had in view. I got that information in time to incorporate it in my paper. It was presented to the American Surgical Association, and it was no less considered on account of anybody else having anticipated it, and we should not look upon Dr. Baxter's splint less favorably because it is an improvement upon some principle heretofore published. The Doctor's breast-plate, fitting against the chest snugly and giving strength to the whole apparatus, is an important element. It imparts fixation; the arm is incapable of moving about forward or backward, as it is with a crutch-shaped splint under the arm. A crutch-shaped wooden splint is one of the most comfortable things for fracture of the arm I have applied. I have no doubt if Dr. Baxter's apparatus is adjusted in that way it will be capable of not only treating fractures of the shaft of the humerus, but also fractures near the articulation above or below the elbow. The extension and counter-extension and fixidity embodied in this apparatus will be admirably suited to the treatmnt of those fractures near the articulation at the shoulder.

Dr. William E. Parker, of New Orleans, La.—I think the splint Dr. Baxter has exhibited has many advantages. It

seems to keep the arm firm, and it has the advantage of lightness. For these reasons alone the splint may be a serviceable one. I am again surprised at the statistics of Ashhurst. Dr. Baxter said in the course of his remarks that Ashhurst makes the statement that of 150 cases of fracture of the shaft of the femur there were 48 cases of non-union.

Dr. Baxter.—In 150 ununited fractures (Ashhurst quoting from Norris), 48 of them were of the shaft of the humerus.

Dr. Parker.—I misunderstood you, Doctor. It seems to me that the proportion of ununited fractures should be much smaller. I have had an opportunity, during my term of service as one of the surgeons in charge of the Charity Hospital in New Orleans, to watch almost all the emergency surgical cases there, and it has been my lot to see many different kinds of fractures, and among them we had our share of fractures of the humerus. Most of the cases for a long time were treated with a rectangular splint; after bandaging well from the hand up and applying the bandage pretty well over the shoulder the hand was bandaged to the side, as shown by Dr. Baxter. The results were good. Of late I have treated some of them by putting the arm up in plaster, starting from the hand, going up well around the shoulder, and the results have been good. Of all the cases of fracture of the shaft of the humerus I have seen treated in the New Orleans Charity Hospital, as well as those of my colleagues, I do not think I have seen a case of non-union.

Dr. John D. S. Davis, of Birmingham, Ala.—This is an admirable splint, and one that can be used very well by those who are not in the habit of treating this class of cases. It has one excellent advantage, in that fixation is obtained by means of the breast-plate. I regard it as the best fracture dressing of its class; but for fractures of the shaft of the humerus, as elsewhere, I think plaster-of-Paris is the best dressing. It is my habit—and I have had a great many of this class of cases—to place the patient on the back and the arm at an acute angle to the body, fixing the forearm at a right angle to the arm, with the hand midway between pronation and supination. This relaxes all the muscles, and you can put the entire limb in plaster-of-Paris, including the shoulder, and secure the best possible results. Of course, if you are not in the habit of applying the

plaster-of-Paris with the forearm flexed, you had better put it on with the elbow extended. I put the arm up nearly always with the elbow flexed, but either way you may get good results. I have treated a great many cases, and have never yet failed to get union in fracture of the humerus. I recently treated a case of fracture of the lower end of the humerus—an intercondyloid fracture, complicated with dislocation and separation of the condyles—with the plaster-of-Paris dressing, and got a perfect result. There is no ankylosis, and the result is surgically perfect. There is no necessity of using any other dressing than that of plaster-of-Paris. It seems to me it is best for every class of fracture. For those who have not had any experience in dressing this particular class of fractures, I think this splint is an admirable one. It will enable a novice to get good results, but any surgeon who uses plaster-of-Paris will not discard it for any apparatus.

Dr. A. V. L. Brokaw, of St. Louis, Mo.—I have been very much interested in witnessing the application of this splint, and while I am in favor of using plaster-of-Paris splints in this class of fractures, yet I hardly give it the indorsement Dr. Davis has given it in all cases. It is a good thing in the hands of experienced men, but those who are beginning to do surgical work had better be careful in using plaster-of-Paris. The more exposed we can leave certain fractures, the better our results will be. I think the Detroit surgeon made a wise remark when he said that we often apply too much in the way of apparatus for the treatment of fractures. We do not leave them exposed enough. As a general thing, we have to exercise the very greatest care in the application of plaster-of-Paris. When you cover up a fracture of great severity, in which there has been laceration of the joint, with the integrity of the joint destroyed in part, and apply a plaster-of-Paris dressing, you do not know what is going on. You have hidden the fracture, and you cannot tell except in a general way what is taking place, and many of the bad results that we see walking our streets to-day, the surgery of reproach, are due to the application of plaster-of-Paris dressings, and I am thankful to see the application of this particular splint that Dr. Baxter has brought to our notice. It merits more than a passing attention. I speak from a fairly large experience as a

general surgeon. While plaster-of-Paris is a good thing in the hands of an expert—and I consider that I am fairly expert myself in its use—still I have had some accidents following its use in cases of fracture of the humerus. I can recall cases at the present time that I should have treated differently if I could have had the advantage of this splint which the Doctor has presented, and I congratulate him on his ingenuity.

Dr. F. W. McRae, of Atlanta, Ga.—One point in the use of plaster-of-Paris. I use it more than any other dressing in the treatment of fractures of the humerus. I never put it on without more or less dread. I see a little girl in Atlanta more frequently than any other patient that I have had. She had a fracture of the lower end of the humerus, and I saw her within two hours after the fracture; there was a good deal of laceration of the tissues, and I applied the plaster-of-Paris dressing immediately. It was not my case, but I was responsible for the result. I turned over the case to another physician to look after it. Three days after I had dressed it the hand was very much swollen, and ischemic paralysis supervened; the child had been crying day and night from the time I had put it on. It was necessary to give the child quite large quantities of opium to relieve the pain. The man who applies plaster-of-Paris dressings in this class of cases will at some time or other get cases of ischemic paralysis.

I consider the splint that has been exhibited by Dr. Baxter the best I have ever seen for the treatment of this class of fractures.

Dr. Baxter (closing the discussion).—I am in the habit of using plaster-of-Paris very extensively in my practice, and I do not suppose there is anyone here who uses it more generally than I do. But in this class of fractures I have a serious objection to its use, which has not been mentioned in the discussion—namely, you have to incise it, so as to relieve the circulation throughout the length of the limb. In that case you destroy the shoulder-cap. Another objection to the use of plaster-of-Paris in the treatment of these fractures is that the plaster, owing to the moist condition of the axilla, will soften down in the course of three or four days, and you can place your hand underneath the shoulder-cap. We can never be quite certain of the quality of our material, and the plaster-of-Paris may break down in these fractures. In addition to that, it

crumbles in the majority of cases; we cannot, therefore, always rely upon it for extension. I have never personally had an ununited fracture of the humerus, but I have been frightened time and again in regard to it, and I have had four or five cases sent to me by others, and I have operated on three of those cases for non-union. Such uncertain results are more than we should by right expect. Whenever the results are so unfavorable in the hands of the general practitioner something is wrong with the apparatus he uses. There is no question in the world about it. I will guarantee that he could not make this mistake if he applies this splint, watching the figure-of-eight which binds the elbow to the joint so as to maintain extension.

Another point I wish to make regarding this splint is that the fracture can be exposed for examination. The outside bandages, as I have demonstrated to you, are used only for steadying the limb. They do not affect extension and counter-extension in the slightest degree, and even in cases of compound fractures the majority of the bone, when these are removed, is open for dressing. Here is the full length of the shaft of the humerus; these bandages can be taken off, thus exposing the fracture for constant examination.

I do not claim, as Dr. Gaston says, originality of principle, but I do claim the application of old principles in a new way, which I trust will prove efficient in the treatment of this class of fractures.

THE RELATIONS OF THE TUBERCULAR DIATHESIS TO ITS LOCAL MANIFESTATIONS.

By J. McFadden Gaston, M.D.,
Atlanta, Ga.

In considering the various forms in which tuberculosis shows itself in different structures there must be an underlying element pervading the whole organization, which results from a general deterioration of the secretions. Whether there is a predisposition to the development of tuberculosis in certain parts or organs in advance of any constitutional disease or not, this change occurs in connection with the general impairment of the vital forces which characterizes the tubercular diathesis.

The reciprocal action or reaction of the constitutional dyscrasia and the local disturbance leads to a derangement of the functions of the different organs of the body. While most recent authorities do not make a distinction between scrofula and tuberculosis, there is a fundamental difference in their general and local development. The modification impressed upon the system of lymphatics by what is generally known as scrofula is so distinct from other disorders recognized as tubercular as to warrant the continued use of this term. We have different characteristics of tuberculosis when it involves separate organs and structures of the body in a distinctly circumscribed form, or is defined as miliary tubercle in different structures, and yet the dyscrasia which marks the lymphatics under the designation of scrofula differs materially from any of the varieties of tuberculosis heretofore recognized.

The old term "king's evil" was applied to scrofulous

affections under the impression that they were associated with royalty, and a well-understood group of symptoms belongs to scrofula.

A prominent surgical author pronounces it a mythical term, which would imply that the disease is fabulous or imaginary. But there is nothing more real in pathological development than the change of structure involved in scrofulosis, and it may be said further that there is nothing more definitely understood by medical men than the application of the term scrofula to the signs of this disease. Quain says we may extend the use of the word scrofula far beyond its ancient limits, without any fear lest the meaning of the term should become proportionally vague and indefinite. The most common morbid affection of the absorbent glands is scrofula.

If we take a chain of lymphatic glands all somewhat enlarged, but only some of them cheesy, we should expect to find the entire stage of the strumous lesion in the glands which look most natural. The first character of the scrofulous disease consists in an excessive irritability or inflammability of the glands, constituting what Thomas White long ago called an inflammable diathesis.

Strumous lesions imply the existence of a strumous diathesis or special disposition to strumous disease.

The strumous diathesis may be detected in two ways, directly or indirectly; it may be manifested by the patient himself or by his kindred. The latter or indirect means of discovering scrofula depends upon a fact in etiology, to wit., the strongly hereditary nature of this disease.

In Foster's *Encyclopædic Medical Dictionary* we find that scrofula is a term applied to a group of symptoms occurring most frequently during childhood, the essential features of which are chronic lymphadenitis and certain diseases of the skin and mucous membrane. There are often bony and articular complications.

Scrofula is associated with strumous and tubercular diseases, comprising pulmonary phthisis, enlargement of ganglions, disease of the hip-joint, psoas, lumbar and chronic abscesses,

Pott's disease of spine, follicular ulceration of mucous membranes, arachnitis, otorrhœa, ozæna, ophthalmia, eczema, and ulceration of the bones. It consists in the deposits of tubercle connected with the strumous or tuberculous diathesis.

Phthisis and scrofula are considered as the same affection in different parts and at different ages. Children rarely have consumption, and adults rarely show external tumors of a scrofulous nature. It has an hereditary character, and there are many deaths among children. The tubercular deposit occurs in all parts except the skin, vessels, nerves, ligaments, aponeuroses, tendons, and voluntary muscles. But most frequently it is found in the lungs and mesentery. The tubercular form is most frequent, and is rarely found in a stratified or infiltrated state, and has the size of a millet-seed to that of a pea. It is of a pale yellowish or grayish hue, so as to resemble curds, and it is hard, like fibro-cartilage. When numerous they coalesce in a tumor of considerable size. Microscopically they consist of a transparent matrix inclosing granules, nuclei, cells, and oil globules. The corpuscles are round, ovoidal, oblong, from $\frac{1}{2500}$ to $\frac{1}{3500}$ of an inch in diameter.

Billroth defines scrofulosis as distinct from tuberculosis, and gives the former a disposition to chronic inflammation of the membranes, bones, and joints, in which the inflammatory process may lead to the development of granulation, suppuration, caseous degeneration; and individuals are very commonly called lymphatic or scrofulous in whom swellings of the lymphatic glands, even if resulting from temporary irritation, run on for a long time or even increase independently of any fresh peripheric stimulus. He considers tubercle as a peculiar form of the inflammatory new-growth, having a close relationship to scrofulosis, and no cysts. The histological structure of tubercle is of the adenoid order, consisting of small spheroidal cells similar to lymph cells, separated by a homogeneous transparent material or by a fibrillated reticulum, which may be enucleated and contain within its meshes groups of these cellular elements. Large cells containing one or two nuclei may sometimes also be seen. Myeloid or large multinucleated cells are

usually found along with the lymphoid elements. Tubercle is supposed by Virchow and Niemeyer to be capable of absorption or undergo fatty degeneration, and Paget describes softening as commencing near the centre. Green holds that the greater the irritation the greater is the tendency to softening; and the less irritation and more chronic the process, the greater is the probability of the fibroid change, which in time may undergo caseation.

Virchow and others regard the gray miliary granules as the typical germ of tubercle, and the yellow as the same in a state of fatty degeneration.

Rokitansky says the seat of tubercle as an exudate is at any point of any texture extraneous to the bloodvessels. Whenever there is a capillary range a deposition of tubercle is possible. The seat of tubercle is without doubt precisely at, or in clear proximity to, the spot of its exudation, its blastema being in the highest degree coagulable. It is most probable for this reason that it does not affect textures nourished from a distance by slow imbibition of the substance with plasma, for example, cartilage. In the lung it usually commences at the apex, in the spongy or in the cancellated structure of bone. Tubercle is a form of degenerated plasma or, more specifically, degenerate lymph.

The causes of tuberculosis are: (1) meagre and unwholesome food; (2) protracted indigestion; (3) exposure to cold, damp, etc.; (4) exhausting diseases; (5) hemorrhages; (6) mercurial courses; (7) stoppage of discharges; (8) mental disquietude and worry; (9) syphilis. These operate by diminishing the plastic elements.

Scrofulous ulcer has a border that is of bluish, purplish, or reddish hue, undermined, hard, jagged, thin and sharp at some points, thick and obtuse at others, with a thin ichorous discharge, or thick and yellowish, mixed with flakes of broken-down tubercular matter.

The cicatrix is of fibroid texture, hard, dense, and tightly adherent to the subjacent structures, with surfaces depressed and marked by prominent radiating lines.

The more important tubercular lesions were considered at length from a surgical standpoint in papers laid before the American Surgical Association at its meeting in May last, at Detroit. For the information of those who may be disposed to follow up the investigation of this subject, I may state that most of the contributions have appeared already in different medical periodicals which are accessible to the profession generally; and they will appear as a symposium on tuberculosis in the *Transactions* at an early day.

The different topics presented are as follows: The Surgery of Intra-thoracic Tuberculosis, by G. R. Fowler, M.D.; Tuberculosis of the Peritoneum, by Robert Abbe, M.D.; Tuberculosis of the Lymphatics, by De Forest Willard, M.D.; Tuberculosis of the Male Genital Organs, by N. Senn, M.D.; Tuberculosis of the Female Genital Organs, by A. Vander Veer, M.D. The discussion was opened by me and continued by C. B. Nancrede, M.D., and J. R. Weist, M.D. Some of the points given by me are here presented.

Some fifteen years ago Robert Koch claimed the discovery of a specific bacillus in tuberculous structures and in the sputa of those affected with phthisis. This organism is described as a slender, rod-shaped, motionless bacillus, which equals in length from one-fourth to the entire breadth of a red blood-corpuscle. The presence of this tubercle bacillus is recognized as the special characteristic of the state or condition known as tuberculosis. While their existence has been pointed out in cases not developing the ordinary features of the disease, and hence raising some question as to the etiological influence of the tubercle bacillus, the generally accepted doctrine is that it produces the disease.

The presence of a condition recognized as a tubercular diathesis corresponds in some respects with the cachexia of carcinomatous tumors, and is held by many to be hereditary. There has been quite a revolution in the opinions of those best versed in the pathology of tuberculosis as to the transmission of this disease from parent to child and also in regard to the communicability from one individual to another by ordinary

contact in social relations. It is fair to conclude that an abundance of caution should be observed in putting restraints upon the marriage of those suffering with pulmonary consumption, and the association of those laboring under this disease should be limited so far as practicable.

The hygienic and prophylactic devices which have been projected and are likely to be adopted for protecting mankind from receiving contamination through the alimentary canal and the lungs are highly commendable. It is true that there must exist a predisposition to tuberculosis for the development of the tubercle bacillus in the organism, but the history of exposure on the part of many not so predisposed being followed by the appearance of the disease, warrants all the precautions which are practicable against contact with the tubercle bacillus.

On the same prudential lines of avoiding the appearance of evil, the elimination of foci of infection should be accomplished by operative measures as promptly as possible. In some cases thorough curetting of affected parts with subsequent antiseptic dressing may suffice. The injection of iodoform and glycerine into cavities having tuberculous deposits, and free irrigation with antiseptic washes have been attended with salutary results.

The tamponage with iodoform-gauze subsequently has a mechanical and medicinal salutary effect when the thoracic cavity is involved, and it is claimed that the support contributes materially to the comfort of the patient.

The more radical operations upon those parts of the lungs suffering with tuberculosis, practised by Tuffier, Tilmans, and others, in excision of the diseased tissues, indicate clearly that it is entirely practicable to remove the tuberculous area from the surrounding tissues. The remaining parenchymatous structure of the lungs becomes restored to its normal condition, and the functions of the lung undergo no material impairment.

In the various operations upon the cavity of the thorax there has been quite a marked diversity of opinions and a

difference in practice as to the subsequent washing out of the pleura. While some have resorted to free irrigation, and even to the use of medicated solutions, with apparent benefit, others have found these measures hurtful; and a considerable number of operators do not employ interpleural washes save in cases of contamination requiring correction.

The beneficial effect of free exposure of the abdominal cavity by laparotomy in tubercular degeneration of the peritoneum, which is claimed by those familiar with this procedure, must impress the student of surgical pathology as very remarkable. Facts are stubborn things which cannot be set aside by reasoning, and however unphilosophical the conclusion may be, from observation of this treatment for serous tuberculosis, it seems that there is no alternative but to yield our acquiescence in its efficiency.

Dr. Robert Abbe says that now, more than at any time in the past, it is the imperative duty of the surgeon to freely evacuate by incision all fluid of a tuberculous peritonitis. In all probability, additional perfection will be obtained by irrigation with normal salt solution and closure of the abdomen. Where advanced tubercular deposits can be sponged over with camphor naphthol, it is probable some additional good will accrue. The cure in undoubtedly tubercular cases may be absolute, though remnants of disease are apt to be latent. The purulent form of tubercular peritonitis is amenable to the same treatment.

It is becoming recognized generally by the profession that immunization from tuberculosis results largely from the environment of the individual, and that in its incipient stage restoration of vigor by open-air life and exercise accomplishes a cure in some cases. Quite a change has come over the surgical practice in local tubercular development, and while the progress of the disease in a particular part may be arrested by operative measures, the tubercular diathesis must be corrected by general treatment. The predisposition to tuberculosis cannot be relieved by a surgical operation upon the diseased structures, but must be corrected by remedial agencies acting through the absorbent and secretory organs.

DISCUSSION.

Dr. A. M. Cartledge, of Louisville, Ky.—I am sure we have been very much instructed by the presentation of this subject by Dr. Gaston, but it is such a large one that a man scarcely knows how to approach it. Tuberculosis is a universally disseminated disease, so far as the body is concerned, and in a general way is so much on the increase in America that it is always of interest, and now more so to the surgeon than physician, from the fact that I believe in everyday practice the surgeon encounters more tuberculous processes than the general practitioner. He draws upon all the predisposed structures in the body, while the physician is called upon to treat tuberculosis as it manifests itself in the lung. The paper impressed me with one point; he spoke of radical operations on cases of tuberculosis. In a general way, I have come to the conclusion that patients with tuberculosis should demand relief from operative interference on very much the same rules that should obtain in operative procedures for malignant disease, and I am quite sure it is often easier to extirpate a malignant affection from a local standpoint than it is tubercular affections. Heretofore we have been very incomplete in our operations upon tuberculous processes. We have often failed to recognize processes that were tuberculous. I think we owe more to Dr. Senn than any other man—American or foreign—for elucidating this subject.

I agree with the Doctor in reference to tubercular peritonitis. This is one of the happy phases of the subject, and certainly everything warrants us in doing this operation at once and promising a great deal, especially in the form of peritonitis characterized by effusion. The dry or plastic form of peritonitis is not so successfully treated by abdominal section as the cases characterized by effusion. Surgical tuberculosis is to be followed up as a malignant disease and extirpated beyond the diseased points. Then we can view the subject from a surgical standpoint, and where the disease is so situated that we cannot do this, we have to rely upon the constructive, as well as general, processes which limit its development or arrest it entirely.

A word or two more, and I am done. I am strongly inclined to think that the observation made in recent years, that tuber-

culosis is becoming more prevalent among colored people than the white, is correct, and, if statistics are of any value, I believe the disease is much more prevalent among both white and black than is generally supposed, and it is for that reason our attention is directed to it. Probably the bad general nutrition in many cases would account for the disease in a measure among the negroes.

Dr. R. B. Rhett, of Charleston, S. C.—I can only discuss the subject of tuberculosis so far as the colored race is concerned. It has attracted a good deal of attention in certain portions of South Carolina, where the population is largely composed of negroes. It is considered there to be of syphilitic origin. Dr. Taylor, who is Professor of Pathology, has treated a number of cases in the hospital there, and believes that he has cured a number of them by large doses of iodide of potassium. The bacilli were found in the expectoration. There was a wide discussion on the subject at the last meeting of our State Medical Association, and a great many of the members were of the opinion that it was syphilitic. Personally, I do not think so. I consider that it is due to a difference in their lives. Their hygienic surroundings are not near so good; they are less out in the open air, and I think tuberculosis among the negroes is largely due to bad hygiene and low nutrition.

I am entirely in accord with the view expressed by Dr. Cartledge, and that wherever it occurs it should be at once, if possible, thoroughly and completely eradicated. I have seen cases where the effusion was large in which the effect of an operation has been wonderful, and for a period of time these patients enjoyed life.

Dr. F. W. McRae, of Atlanta, Ga.—For the last thirteen years I have been seeing a great many surgical cases in colored people. During the first three or four years of my professional life I was associated with the elder Westmoreland, and later with the late Dr. Armstrong, of Atlanta, in surgical work. I saw a great many negro patients treated surgically. For the last five or six years I have conducted a clinic of my own, part of the time associated with Dr. Gaston, and alternating our clinical work, and the increase of tuberculosis in the negro has struck me as being very remarkable. Formerly, it was an ex-

ception to see a case of local tuberculosis in one of these clinics. Now, I should say that at least 50 per cent. of the cases that come to our clinic are of a tuberculous character. I believe they are the most difficult cases to deal with that we encounter. I never know when I operate upon a tuberculous patient whether he has scrofulous glands of the neck, tuberculosis of bone, or of the joints, whether I have done a thorough operation or not. I have never put on a dressing, feeling that the operation is completed. In some cases, where the operation has been apparently thorough, I have gotten untoward results and found subsequent operations necessary. I know of no operations in surgery that are more tedious than the removal of large scrofulous glands.

As to the treatment, I do not believe there is much in medicine, as a rule, in the treatment of local tuberculosis. The hygienic condition of the patient, fresh air, sunshine, and exercise in the open air, and an abundance of it, are the agents which give us the most beneficial results, and not medicines. I think we get comparatively little good from medicines in this class of cases, and I concur fully with the statement made by Treves in his recent *System of Surgery*, that we should give these patients three things—good food, fresh air, and plenty of exercise and sunshine. I believe all of these cases are distinctly tubercular; that the tubercle bacillus can be found in scrofulous glands, bones, and joints, as Dr. Gaston has stated, and it seems to me it is better to consider them as different manifestations of the same process, the difference in manifestation being due rather to the condition of the system and the time of life at which this disease occurs than to any difference in the pathogenic organism. The special point at which the manifestation of this process takes place is due entirely to the point of minor resistance which is being attacked. These tubercular bacilli gain entrance through the system by the digestive or respiratory tract and circulate harmlessly for an indefinite period of time, until they find some point of least resistance, which may be due to a slight injury, to taking a cold, or due to any number of causes; but whatever lessens the resistance in a particular locality tends to cause the bacillus of this disease to manifest its characteristic symptoms at that point.

Dr. James A. Goggans, of Alexander City, Ala.—I regret

that I did not hear all of the paper. It has fallen to my lot to see quite a number of cases of local tubercular disease. I believe I have obtained better results in those cases on which I have operated, particularly where the disease was confined to the peritoneum, than by other measures of treatment. I will cite one case on which I operated last May.

The patient was in bed, had a temperature of 101° F., pulse 110. She had been confined to her bed for several months. My diagnosis was imperfect. She was so distended with gas that it was impossible to make a positive diagnosis. I made an exploratory incision and found the whole peritoneum studded with yellow, tubercular deposits; there was a thickened condition of the mesentery, and the intestines were all glued together. I simply drained, let out half a gallon of fluid, washed out the cavity, and closed the incision. In that class of patients I believe we get the best results from operative interference.

Dr. Gaston (closing the discussion).—I am pleased that my paper has elicited so much discussion. My object in bringing this subject to the attention of the members of this body was because it was considered an important factor from a surgical standpoint by the members of the American Surgical Association. In preparing the paper I drew from the valuable contributions made on this subject which have appeared in the *Transactions* of that Association.

THE RATIONAL TREATMENT OF THE DISEASED APPENDIX BY OPERATION.

By A. V. L. Brokaw, M.D.,
St. Louis.

It requires more than ordinary courage to express an opinion, much less write a paper, at this time, with the appendix for a subject. A retrospect of the literature of the past few years shows a perfect Niagara in the volume of articles; and if our friends, the medical editors, do not relegate all such efforts to the waste-basket, the profession will continue these dissertations. The question that has been and is vigorously discussed: "Is the disease a surgical one at all times or only surgical at times?" I wish to be on record as favoring the first proposition. Some of our ultra so-called conservative friends claim that the surgeon who advocates the removal of the appendix in every case when diseased is a dangerous fadist, an extremist suffering from inoculation of the operativus bacillus. These unkind critics, to my mind, would look with suspicion, doubt, or hesitancy upon any advance of surgical origin. Some of them express a faith in a medical treatment as absurd as the doctrine of Doctor Sangrado. In a recent paper, in giving my views as to the proper course to pursue in this dread disease, I can but repeat that all diseases of the appendix and iliac fossa demand a radical treatment by operation. This conclusion is born of experience, and is the result of careful study of cases under observation. Cognizant that the above positive view will not meet with the approval of many, even of large

experience, I can only state I have no regrets to offer for the cases operated upon, many regrets for some not operated upon. True it is that a very large percentage of cases recover without operation by the so-called medical treatment—a treatment of such elastic nature as to be applicable to all conditions of obscure and non-obscure nature originating in any part of the economy. This treatment, antedating a knowledge of the pathology of the disease, has been handed down and variously modified since the time of that erudite father of medicine, Hippocrates. Fortunately, the medical treatment of appendicitis has an ally of great potency in the individual powers of resistance of the unfortunate patient. The manifestations of this power of resistance to the onslaught of the disease is evinced by the barricades of lymph which wall off the seat of disease from the general peritoneal cavity; the subsequent disposition of the morbid products of the destructive process is effected by the *herculean* efforts of nature. In any failure of these efforts, nothing remains but a fatal termination of the case, save and except by the intervention of surgery. The principal arguments, to my mind, for aggressive treatment of appendicular affections are the protean forms and the rapid, kaleidoscopic changes the disease presents. The brand of treachery is a marked characteristic. In no given case can we be positive as to the character of the lesion of the appendix, nor what efforts on the part of nature have been made to repair the same, or how well. A case which to-day presents a favorable aspect, to-morrow is seen *in extremis.* No one can state with any degree of certainty the outcome in any given case. Our prognosis is but too often of no value. When the anxious patient is informed that no operation will be necessary, we assume too much. In a small percentage of cases an operation, no matter when performed, will not avail. Carefully compiled statistics show a balance in favor of operation, which fact should be given to the patient and the uncertainty of the medical treatment explained. I do not believe the shock of operation with the attendant risks adds much to the gravity of the situation, as

a rule. The uproar raised against operation because of the occurrence of ventral hernias does not merit consideration. While their occurrence is unfortunate, a life is at stake, and this argument is cowardly. In many of the cases of apparent recovery without operation relapses follow of greater or less severity, a fatal termination occurring months and even years after the primary appearance of the disease. We cannot guarantee a complete recovery in any case after an attack —the patient's health is at times impaired more or less seriously for months. In individuals of bad ancestry, the tuberculous, for example, the attack may mark the starting-point of a decline—a decline which terminates fatally from an aroused tubercular activity. A diseased appendix makes a perfect culture-medium or habitat for the tubercle bacilli and other germs. Every case of appendicular disease not operated upon will merit more than passing attention for months. The advantage of early removal of the appendix is a proposition which cannot be objected to with the knowledge we have of the pathology of the disease—a knowledge attained only after the sacrifice of more lives than were lost in any of the greatest battles ever fought. It is this knowledge of the pathology of the disease that at this day leads the best medical authorities to abandon the medical treatment and refer these cases to the surgeon. An early diagnosis backed by an early operation may at once cut off the source of infection; an operation instituted at a period before gross destructive lesions are present is approaching a surgical ideal, placing the patient in a favorable position to meet, by his individual powers of resistance, the attacks of the elements of a mixed infection. A short exploratory incision in any doubtful case is justifiable. No error of great gravity will be committed even if the appendix be not at fault, for an obscurity will be removed. While such incisions are admissions of our fallibility of diagnosis, surgery is not an exact science. At times on opening the abdomen the appendix shows no gross macroscopic lesions, but some slight congestion or œdema. Remove all such appendices. It has been shown repeatedly by

competent observers that an appendix showing but slight, almost no gross change, has, nevertheless, vomited myriads of micro-organisms capable of exciting peritoneal inflammation of gravity. The germ-escape takes place in these cases through the stomata of the cells forming the peritoneal covering of the appendix. The objection to removing an appendix cannot be raised on the ground of any essential importance of the organ to man, for it is an organ without physiological or anatomical import, a useless appendage, a relic without function, only reaching any degree of dignity by reason of the constant menace of its very presence to the possessor. Let it not be understood that I advocate the removal of the appendix in every instance when it is diseased, regardless of the circumstances in the case. Far from it. I earnestly advocate early operations as soon as the diagnosis is made. Always operate when there is even a slight chance of saving a life, regardless of a damage to statistics. Invariably, operation is to be insisted upon in the recurrent cases. It is useless to operate in those cases when every indication points to the patient being on the eve of dissolution. It only brings surgery into disrepute. Miracles are seldom seen in these later days. With the knowledge of this dread disease evolved from the mortuary chambers and the treacherous clinical course in a considerable percentage of cases, why should the rational treatment of all be other than by prompt surgery?

REPORT OF CASES OF APPENDICITIS.

By J. A. Goggans, M.D.,
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The fact that physicians generally take the stand that operative interference in appendicitis is called for only in exceptional instances where the disease advances to suppuration, gangrene, and perforation, makes the treatment of appendicitis a never-ceasing controversy; hence my excuse for reporting a few illustrative cases that have come under my observation, hoping thereby to add what I can to harmonize the difference between the physician and the surgeon on this the most frequent and important intra-abdominal lesion of the present day. The main point at issue between the physician and the surgeon in the treatment of appendicitis depends much upon a perfect diagnosis. This, too, accounts in a measure for their differences of opinion as to where the medical treatment should end and where the surgical treatment should begin.

According to my experience in the management of this affection, believing as I do that it is a surgical affection, there is only one course to pursue, and that is to remove the appendix just as soon as the diagnosis is made.

I usually defer the operation until the bowels have been evacuated by first administering a few small doses of calomel, followed by a saline purge. I believe it to be the duty of the surgeon to operate in every case, no matter what the physical condition of the patient may be, unless he knows that death is already inevitable from sepsis. And in the milder cases, of both acute and chronic appendicitis, when laxatives fail to bring speedy recovery, such patients should have the benefit of the operation.

I report the following case to illustrate the fact that the longer the operation is deferred the greater the danger to the patient. He was partially relieved several times during the administration of salines, and the family hesitated to consent for the operation to be done. I show you the specimen of a diseased appendix, which had not ruptured, removed from a man twenty-five years of age, and who had not been relieved after two weeks of medicinal treatment. The patient presented the ordinary symptoms of mild typhoid fever, accompanied by localized induration and tenderness in the region of the vermiform appendix. The appendix was adherent to the cæcum, pointing downward. As already stated, this appendix had not ruptured, but was so soft that it could easily be amputated by tightening a ligature. It was tied off close to the intestine. The subsequent treatment consisted in gauze packing and drainage. Recovery.

The first case of perforating appendicitis that came under my observation occurred in 1879. The patient was a female, forty-five years of age. I had in consultation the then best known gynecologist in Georgia; the diagnosis of typhilitis was made, and treatment consisted in the administration of laxatives and liquid foods. The abscess finally ruptured in the right iliac region, but the patient died some months later from general peritonitis.

In 1886 I treated two cases of appendicitis, one the wife of a physician, aged twenty-five years, the other a male, aged twenty-two years. In both of them there was a distinct point of tenderness and swelling in the region of the caput coli. I administered laxatives and removed a few drachms of bloody serum in each case with the small needle of the aspirator. The physician's wife had three attacks, but has had no return of the disease since 1886. The other case likewise recovered.

On October 21st I saw Mrs. R., who had been sick one week; was taken with severe pain in the abdomen, and had become localized in the right iliac fossa. Her pulse was 130 per minute, temperature 102.5°. The operation consisted

in simply opening the abdomen over the abscess-cavity, evacuating the pus, irrigation, and drainage. The patient made a good recovery.

A male, twenty-five years of age, had been attended by Dr. Harlan for four or five days. His illness commenced with pain in the abdomen, followed by nausea and vomiting; localized pain in the right iliac fossa extending almost to the umbilicus; pulse 110, temperature 102°, respirations 30 per minute. The abdomen was opened over the indurated tissues, and the abscess-cavity was found to be walled off by adhesions. The appendix was found to have been amputated spontaneously. The subsequent treatment consisted in irrigation and drainage. Recovery.

Thomas M., male, aged twelve years, was taken with a severe pain in the abdomen on November 1, 1896. Dr. Coley saw this patient November 4th, found his pulse 130, temperature 102.6°, respirations 30 per minute, localized induration and tenderness in the region of the appendix. He diagnosticated appendicitis, advised an operation, and administered a few half-grain doses of calomel, and followed it with one dose of sulphate of magnesia. I saw the patient the next day, November 5th, in consultation. His bowels had been thoroughly evacuated, but his temperature was 102°, pulse 120, and respirations 30 per minute. The induration, tenderness, and swelling were very perceptible through the rigid abdominal muscles in the right iliac region. Operation was performed, and I here show you the fresh specimen removed. On cutting through the abdominal walls offensive gas and pus escaped. You will perceive that this is a considerable portion of the omentum that seemed to have gathered itself around the gangrenous appendix, walled it off, making this a receptacle for the gangrenous portions as well as the pus, thereby preventing its escape, and disseminating itself throughout the peritoneal cavity. This specimen is a nice illustration of one of the functions of the great omentum, viz., to go to the relief of the other abdominal organs when attacked by inflammatory action. Recovery.

I will report only one more case, which occurred in the person of a lad, sixteen years of age. The intestines were lying between the abdominal walls and the abscess-cavity. The wall of the abscess was incised, drained, and stitched to the abdominal incision. Recovery.

DISCUSSION ON PAPERS OF DRS. BROKAW AND GOGGANS.

Dr. Joseph Taber Johnson, of Washington, D. C.—Mr. Chairman: I believe with the essayists, that appendicitis is a surgical disease, and the case should be under the care of a surgeon as soon as he can be called in, even to aid in making a diagnosis if there is a suspicion of the existence of the disease. The condition is so important, and the danger so great, that no time should be lost in seeking a surgical opinion as to whether it is a case of appendicitis or not.

Dr. Brokaw, in his paper, stated that very little was now being done in the way of medical treatment of this disease. If anything whatever is to be done by medical treatment it should consist largely in putting the patient at rest in bed, where he should be kept until cured or operated upon. These patients, when allowed to go about as soon as pain has been relieved by opium or otherwise, have a dangerous form of the disease. They are very liable to have a relapse. The first thing to be done medically in these cases is to prescribe a good, generous laxative, either of calomel, bicarbonate of soda, or castor-oil, for three reasons: In the first place, for emptying the full bowel of impacting fecal scybala, which may be causing or increasing the pain at the site of inflammation or of the pain. Secondly, for the purpose of carrying away from the seat of possible infection colonies of germs located at this point, which are dangerous to the inflamed appendix. Thirdly, for the purpose of increasing peristalsis, which, in causing the intestine to empty itself, will encourage the vermiform appendix to do likewise.

Having spoken of what seems to be safe medical treatment in these cases, I wish to say a word in regard to the administration of opium. It is one of the most enticing things to give opium for the purpose of relieving pain. Perhaps there can be

no greater harm done to patients suffering from suspected appendicitis than to mask the symptoms by administering opium, as it brings about that delay in operative interference which may result in a fatal termination of the case. When the patient is under the influence of opium the pain is relieved and other symptoms are masked, and the belief is expressed by the patient that he is better, and therefore the paient's friends and family physician hesitate in sending for a surgeon. Later, perhaps, the patient is seized with agonizing pain, and the surgeon is sent for, to find a perforation of the appendix. Opium may be the patient's greatest enemy, instead of his greatest friend, under the circumstances, as it confuses a diagnosis which would bring about a plan of treatment which would possibly save the patient's life. Under the influence of an empty bowel and the peculiar action of saline purgatives they can get relief from pain which they could get from opium and in a much safer way.

Another thing often done by the family physician where there has been constipation associated with appendicitis, is to resort to forcible enemas shot up into the bowel for the purpose of bringing about evacuation of its contents. In several cases reported by Deaver and others there have been perforations of the already weakened spot where the appendix was diseased and weakened at its attachment to the cæcum. Appendicitis, then, is a surgical disease. This being the case, what is going to be done by the surgeon? In the vast majority of cases the appendix should be removed as soon as the diagnosis is made. No physician can tell how soon the relapsing, catarrhal, chronic form of appendicitis is going to occur again and prove fatal, and for that reason I would urge an early operation, particularly where an accurate diagnosis has been made. In appendicitis it is much safer to remove the appendix and relieve the agonizing anxiety which must constantly menace both the patient and his friends. As Dr. Brokaw said in his paper, it is not like removing the ovaries or the uterus under a mistaken diagnosis, or any other condition where patients could be cured without operation and have saved to them important organs for the propagation of the race and the happiness of their families; but if the appendix is removed under a mistaken diagnosis, no organ is taken away which is of much importance, and there is no particular harm done except the slight danger of the operation itself.

The essayists have said that if an operation is to be done, it is to be done early to give the patient the best opportunity for recovery. One has only to contrast late operations with early ones to become convinced of its much greater safety and much greater ease in its accomplishment. Where we make a diagnosis and operate before the formation of pus the operation is simple. There is no infection of the peritoneal cavity; there have been no formidable adhesions produced by the inflammatory process, and the operation in the great majority of cases is successful. In many cases of delayed operation we have unmistakable evidence of pus by fluctuation and evidence of sepsis, and consequently we have one of the most formidable operations in surgery to perform, unless the abscess is walled off, and all some operators attempt to do then is to let the pus out, irrigate, and drain. This is equivalent to opening an abscess, and it requires no special skill. If the walls of the abscess are not broken into the patient often recovers from the condition. But the great point which troubles surgeons in performing this operation is whether in these cases it is best to remove the appendix or simply open it and irrigate and drain. It would seem to me from the experience I have had in dealing with cases of appendicitis that a complete operation should be performed. Speaking from the standpoint of the gynecologist, where we are operating on bad pus cases through the vagina by simply tearing into the abscess and letting out the pus, irrigate and drain, and thus save the patient's life for the time, we have left a condition which gives the patient a great deal of discomfort afterward. In the same way in a certain number of cases you open the abscess, let out the pus, and you have left a lot of adhesions. You have an appendix, if you do not take it out, which is liable to give considerable trouble; and in a large number of cases your operation is incomplete. I maintain that a complete operation should be done in a great majority of cases. I would not say in all cases, because there are a certain number of cases that do get well.

Deaver, in his recent book on *Appendicitis*, estimates that 16 out of 400 cases will get well if we do not treat them surgically. I believe that the appendix should be removed in all cases where it is possible to do so. In this, as in other important operations,

a good deal will depend upon the surroundings of the patient and upon the skill of the operator. It is better for the patient to have the services of an expert surgeon who will remove the appendix, do a clean and thorough operation, so that no further trouble will occur afterward.

In the relapsing form of appendicitis the operation is wonderfully successful. You doubtless remember a paper that was read before the Medical Society of Virginia by Dr. Hunter McGuire of eighteen cases of relapsing appendicitis, in which he succeeded in curing the patients in seventeen instances. In these relapsing cases we do not know, as the authors of the papers have said, at what moment they may have another attack and whether that attack would be fatal or not. The appendix could be safely removed in the interval between the attacks which are likely to recur, and the patient's life is quite likely to be saved.

Of course, in determining when or when not to operate, great judgment is demanded, and no man ought to lay down cast-iron rules and say that because he has a case of appendicitis he will open the abdomen and take it out anyway. If, after consultation, a diagnosis is accurately made of appendicitis it is safer for the patient to have his appendix removed. The diagnosis should be arrived at with the greatest deliberation, with great conscientiousness for the patient's welfare as well as for the credit of the surgeon.

Dr. James McFadden Gaston, of Atlanta, Ga.—I had hoped some other gentleman having a larger operative experience than I have had with appendicitis would have followed in this discussion. I would like to know from the authors in what number of cases, if any, foreign bodies were found in the appendix.

Dr. Goggans.—I have found no foreign bodies in the appendix in the cases I have operated upon.

Dr. Brokaw.—In almost every case of appendicitis we will find a foreign body of some kind, such as an enterolith, inspissated mucus, a little nodule, a little lump of fecal matter, etc., and these are called by different names by surgeons. I think if the small bodies so frequently found in the appendix were subjected to careful scrutiny by an expert, we would find that the fecal concretions were made up largely of some undigested mat-

ter, some vegetable fibre, or something of that kind, together with mucus and detritus that are thrown off. As far as grape-seeds and orange-seeds are concerned as having been found in the appendix, I think they are largely the poetical findings of the operator. Very seldom will we find a foreign body.

Dr. Goggans.—I wish to modify the answer I gave Dr. Gaston's question in this way, that I have found no foreign body, strictly speaking. Of course, I have seen fecal matter in the appendix, but have never found any hard solid body.

Dr. Gaston (resuming).—I think there is a wide difference of opinion in regard to this matter of foreign bodies in the appendix. In those cases where an inflammatory action is set up in the appendix the presence of enteroliths is probably the rule; but so far as imagining the presence of foreign bodies of that kind, in my early observations of appendicitis I unfortunately only had opportunities to make post-mortem examinations. I did not get an opportunity to operate at an early period, and in one of these cases I found a bean, with all its characteristics. The gentleman had undoubtedly swallowed this bean, and it had become a source of trouble in the appendix, had set up irritation, and caused perforation.

In another case, which occurred in the person of a colleague, the man had been eating grapes to a considerable extent, and grape-seeds were found post-mortem in the appendix. The appendix was also perforated. The distinction between those cases that have foreign bodies in the appendix and those that are simply inflammatory conditions of a catarrhal nature, leading to a general inflammation around the caput coli, is a very important one, and we have no means of determining it except by exploratory operation, so far as I know. In short, I think until we have inflammatory conditions which lead to an exudate upon the caput coli it is a difficult matter to determine exactly the precise condition which exists in supposed appendicitis. I am becoming more and more impressed with the fact that there are cases of appendicitis that are not attended with perforation that are curable without operative measures. I have had a number of cases in my hands in which I thought I could temporize a little for a time, and under temporizing they have improved so much as not to necessitate any operative interference.

I had a case, not long since, of an old gentleman who was suffering a great deal of pain in the region of the appendix. There was a well-defined lump. The caput coli was indurated and thickened, and I felt at once that it was probably a case requiring surgical interference. I asked to have another physician called in, and as Dr. Holmes has considerable reputation in this department of surgery, from the fact of having treated the Governor of Georgia for appendicitis, he was called in. He concurred with me in reference to the indications of acute appendicitis. He also at the same time concurred with me in allowing temporizing measures and of watching the case closely. We gave two-grain doses of calomel and five grain-doses of soda until twelve grains of calomel and thirty grains of soda had been administered. Upon concluding that the patient was given a dose of castor oil. The lump which had formed in the right groin was treated locally with belladonna ointment and hot poultices, and no operation was performed. Undoubtedly there are cases of appendicitis which we can afford to watch and wait for, but this watch-and-wait business should be very systematic, because I have found in two or three cases in which I had been called and suggested this policy of watching and waiting, that it was not done judiciously, and when called again to see the cases they were almost moribund.

In the case of females we have a puzzling question with reference to appendicitis. I have been called in several cases to see women, and how are we going to make a distinction between an inflamed ovary or an inflammation in the pelvic region located about the neighborhood of the appendix and appendicitis? I am quite at a loss to determine this. I have had several cases in which I have not been so unfortunate as to have recourse to any operative measure to verify the fallacy of the suspicion. I think if those who are familiar with the treatment of these cases could throw some light upon the subject it would be very important.

Now and then we have an exudate around the appendix, extending along the line of the colon up nearly to the liver. I had an opportunity of witnessing an operation under circumstances of this kind by Dr. Deaver, in Philadelphia, some years ago. Dr. Deaver has become conspicuous just now from the

fact of his having reported a long list of favorable results in the operative treatment of appendicitis, and I believe he advocates operation in every case where the diagnosis has been clearly made. In the case I refer to, however, he acted upon the diagnosis made by Dr. Wolff, who had reported the case to him as one for operation. I went with him to the penitentiary, where he was to operate, and he proceeded, without any preliminary other than that given by Dr. Wolff's diagnosis, to cut into the region of the appendix, and found an inflammatory exudate extending along the loin the consistence of the liver, resembling the mottled appearance of the lung, fully as thick as my hand, extending from down in the pelvis up entirely to the liver. He scooped out the mass with the hand, put a ligature around the appendix, which was not perforated, and removed it. The man at the time had an acute peritonitis, and ultimately survived.

My own conviction about operating in cases of perforation of the appendix is very clear. If we can settle distinctly upon those indications which point clearly to perforation of the appendix, not a moment is to be lost in proceeding to open the abdomen and tying off the appendix and removing it. Undoubtedly this procedure is clearly indicated. All agree at present in regard to those cases where we have a circumscribed abscess walled off by adhesions all around the appendix and caput coli, that it is not a matter of any material importance about seeking to remove the appendix or to search for it very much, because we have under such circumstances a disintegrated appendix, which is no doubt shut off from the caput coli, and no material good is to be gained by exploring in the midst of pus and débris that exist under such circumstances. So far as I can understand, that seems to be the course which is generally recommended by those who are most familiar with these operations. It is plain sailing in a case of this kind by operative measures. It is little more than opening up an abscess, closing it, and packing the cavity with iodoform-gauze.

I do not feel, even from the opportunities I have had, that it is an easy thing to make a diagnosis. I recollect being called some two years ago by Dr. Todd, of our city, to assist him in a case in which he had diagnosticated appendicitis, where there was absolutely nothing I could feel nor perceive by any kind of

examination on the first occasion that would lead me to infer that there was any inflammatory action about the appendix. But we watched the man for twenty-four hours, and the symptoms seemed be to increasing, with indications of local inflammatory action. I operated on the man, and the first thing that came out after opening the abdomen was pus, notwithstanding the absence of any induration or lump or hard body in the region of the appendix. This was walled off as well as it could be done with gauze, the cavity washed out with peroxide of hydrogen, and afterward with water. The appendix was removed. It was found that the enterolith had perforated the appendix. The case progressed satisfactorily and got well. The man has since been married, and is very healthy, so far as I know. I cannot throw any further light on this subject in my allusion to these cases generally.

Dr. F. W. McRae, of Atlanta, Ga.—It is with a good deal of diffidence that I take issue with the essayists on this important subject, but I have a very firm conviction as to the treatment of appendicitis. I wish to state in the beginning that I do not believe every case of appendicitis is a surgical one from its incipiency. I positively do not believe that. I believe, with Dr. Johnson, that every case should be watched carefully from the beginning by the physician, and that a surgeon should be called in in case it calls for surgical treatment. I do not believe a disease which shows so large a proportion of recoveries without operation is always an operative disease. Treves and other English surgeons say that 80 per cent. of all cases of appendicitis will get well from the primary attack without operation, while 20 per cent. of them will die. I believe that it is nearly true. For several years while I was demonstrator of anatomy I examined every appendix which came upon the dissecting-table, and kept an accurate record of the cases, and about 33⅓ per cent. of the cases examined showed evidences of previous inflammatory trouble around the appendix. Most of these individuals had lived and subsequently died from some other disease, but not from appendicitis; still there were unmistakable evidences of the disease having existed in the vicinty of this organ. I believe these cases during the first attacks should be carefully watched, and my experience has been very much along the line

of that detailed by Dr. McGuire. I give them a cathartic, and after the cathartic has acted thoroughly, if there is no evidence of improvement, I then feel that the case is probably a surgical one, and prepare myself to operate. If the symptoms are progressive, I advise immediate operation. Where there has been more than one attack I think the danger is less, because we know each attack leaves protective adhesions; that these adhesions protect the general abdominal cavity. In case there is rupture of the appendix we have it rupturing into this capsule, if I might use that expression, and the protective adhesions shut off the abdominal cavity, and we have, instead of a general peritonitis as a result of perforation of the appendix, a localized abscess. I believe, in cases of relapsing appendicitis, efforts should be directed toward carrying the patient over that attack with a view to operating in the interval. When we consider that in the hands of the very best operators during the attack the statistics show from 18 to 20 per cent. mortality, while in the interval between the attacks they only show 1.7 per cent., it should make us hesitate to operate upon all cases as soon as the diagnosis is made. I do not agree with Dr. Brokaw that the danger to the patient is not increased by an operation, that there is very little increase in shock in a large proportion of cases following early operations. Frequently, where we have a local peritonitis without protective adhesions, I believe the operation itself enhances the danger materially in those cases even where it is done early. I may be at fault, but I am firm in that conviction. I do not think there is any doubt about the proper course to be pursued in the chronic relapsing cases of appendicitis. I believe, however, the duty of the surgeon is to advise operation in a large proportion of cases where it could be done with perfect safety, and when so done it is one of the most brilliant triumphs of surgery. Such eminent surgeons as McBurney and Bull are now taking the position that where the cases can be carried through the acute stage it is much better to do this, and operate in the interval. With that view I concur most fully. I do not know of any physiological function which the appendix has. It may have some function which we do not at present understand. It brings surgery into disrepute to operate on a patient who has general peritonitis after forty-eight

hours, with a pulse of 160, in a state of collapse, with cold and clammy perspiration. If I should undertake an operation under these circumstances I am sure I would fail. I would not hesitate, however, to operate where there was a reasonable hope of saving life. Operations under conditions like these prevent a great many people from being operated on who really need surgical interference. It is bad surgery. It is bad surgery in abscess cases to attempt to remove the appendix when its removal necessitates breaking down the protective adhesions that have been formed, shutting off the focus of infection from the general peritoneal cavity. I do not believe that it is a proper surgical procedure. The statistics show that an appendix which is once very much inflamed and in which active suppuration has taken place, where the abscess is opened, the recovery is practically complete in a large proportion of cases. It is only a small proportion of cases in which there is ever any trouble developing afterward. Taking the statistics into consideration, it is bad surgery to break up the protective adhesions and to endanger the patient's life by opening the general cavity to virulent infection.

I do not believe that cases of appendicitis should be treated with opium. But if I myself had appendicitis and did not have the greatest confidence in the surgeon who was to operate, I would prefer very much to have a good physician and let him give me a hypodermic occasionally and treat me through the attack. That is the way I feel about it. I believe some of the cases are treacherous. I do not believe that the majority of cases are of that character. They are the minority instead of the majority, and I believe the surgeon who watches his cases carefully and sees them several times a day will be able to have a pretty clear idea as to when they become strictly surgical. I question whether a larger proportion of patients would get well if they were all operated upon than if they were all left alone and treated medically.

I think Dr. Deaver's statistics are absurd, when he says that 16 out of 400 cases will get well. There is no foundation in pathology for that statement, and I do not know where he obtained such statistics.

Where this disease occurs in children, temporizing is of no avail, and I believe in all of the cases of appendicitis occurring

in children an operation should be performed. Frequently we have breaking of the abscess-wall, with perforation of the appendix, in such cases. Where there is a distinct tumor and a sudden feeling on part of the patient that he is getting better, I believe something has given way. The patient feels better for a few hours, and then we have symptoms of collapse, which are due to the poison poured out in the general peritoneal cavity several hours before.

Dr. Howard A. Kelly, of Baltimore, Md.—I have listened with a great deal of interest to these papers on appendicitis, and I could not help thinking of the unfortunate minority who die. I lost my friend, Dr. Gorgas, of Harrisburg, not long ago in an attack of appendicitis; the doctor who was treating him delayed too long. The best thing for the patient who has a frank attack is to be operated on, for fear he might be one of the unfortunate minority. When we come to consider the repeated milder attacks, the growling forms of appendicitis, then it is a different matter. If the recurrent pains are causing the patient a great deal of discomfort it is best to operate, and given a good surgeon with a good technique the operation is a safe one.

The first case reported recalls Dr. Gaston's remarks about the difficulty of distingushing appendicitis from disease of the right tube and ovary. A case in point. I was called to see a woman who had a very high temperature, a distended abdomen, and it was impossible to say whether she had appendiceal trouble or disease of the tube and ovary. I opened the abdomen, evacuated a quart of fetid pus, washed out the cavity, and found a large gangrenous tube and ovary and a gangrenous appendix. She had both affections. She recovered very nicely from the immediate effects of the operation, and got up, but she died suddenly on the thirtieth day after the operation from abscess of the liver ruptured into a bronchus. It was one of those rare cases in which the infection was carried up by the portal veins and the focus of infection lodged in the liver. I estimate roughly that from 5 to 10 per cent. of all my inflammatory gynecological abdominal cases have an associated appendicitis or per-appendicitis. The appendix is down in the pelvis, glued to the inflamed ovaries and tubes, or is sometimes caught up by an ovarian tumor, and is lifted up out of the pelvis and has to

be removed with the other diseased structures. I cut down on the left side, then across the uterus, reach the structures, get at the adhesions from below, bring out the appendix last, cut it off, sew the peritoneum over, and drop it. I know of no mortality due to such operation. I think the operation in simple cases is a safe one. If I had an attack of peritonitis myself I should prefer to be operated on at the earliest possible moment by a good surgeon.

Dr. Charles P. Noble, of Philadelphia, Pa.—I have had my own appendix taken out. Appendicitis is a very dangerous disease in Philadelphia for doctors. About fifty physicians in Philadelphia have had their appendices removed. I know at this time of three internes in one hospital who have had their appendices removed. I agree with the reader of the first paper that if we have a well-marked case of appendicitis the safest general rule is to operate, and to do so early. The great difficulty, as I view the matter, is that it is impossible to differentiate the cases which will recover from the primary attack from those that will die, and I believe, after balancing up the chances pro and con, in good hands the safest thing is to operate as early as possible. I have been led to this opinion not only by the experience of others, but by my own consultation work in which, unfortunately, I have been called in late. I had the curious experience of never seeing a case of appendicitis until the tenth or twelfth day for some years. All of my consultation cases happened to be of that character, and finding what a formidable class of cases we had to operate on, I was the more prone to accept the opinion of those who have had the most experience—namely, that the earlier we operate the better. Regarding my own case, I did not have appendicitis in the sense of having fever. I never had any fever, but had pain in my appendix all the time when I did anything. If I went to bed and lived on soup I felt comfortable, but in working I had pain all the time, and I felt I would rather have my appendix removed. That rule applies to the class of mild cases, and it is purely a question how much the patient suffers from the condition, plus the possibility of a septic peritonitis.

Dr. M. C. McGannon, of Nashville, Tenn.—In listening to the discussion one is impressed with the fact that nearly all of

the speakers favor operative interference in every case of appendicitis. There are, without doubt, cases of appendicitis that do get well without operative procedures. Let us go back to the early history of this disease. People died years ago with what was supposed to be inflammation of the bowels; but now a great many, if not all such cases, are put down as appendicitis. Later on in the history of the disease, inflammatory conditions of the peritoneal cavity about the head of the colon were spoken of and described as typhlitis and peri-typhlitis. They are now usually characterized as appendicitis. We have gone to extremes in this matter. Every case now of inflammation that occurs in the vicinity of the appendix is called appendicitis. It strikes me from the discussion in the *Medical Record* between physicians and surgeons in reference to this matter, in which one class claims that these inflammations are appendiceal and require operation, and the other class maintains that they seldom require operative interference, and that if they are not operated on more of them will get well than if they are operated upon, that there should be some explanation for this difference of opinion. It may possibly lie in the fact that the pendulum has swung too far in one direction. There are some cases of inflammation of the colon in the region of the appendix, accompanied by elevation of temperature and pain, that do recover under medical treatment. By the use of calomel and soda, or opium combined with calomel and soda, the bowel is cleared out, and if the patient adheres to a mild diet for a certain length of time the colon becomes normal, and so we have a case of appendicitis cured medically. This may be the explanation of many cases that are treated medically and reported as having recovered.

Notwithstanding this, I do not believe any case of *true* appendicitis is cured medically, and sooner or later the patient so suffering will require an operation.

A great many mistakes are made in diagnosis. Many cases of appendicitis, so-called, are cases of inflammation of the colon, and if they are treated medically they get well. I recently operated on two cases of inflammation of the colon. Both had gone on to suppuration. It was simply a question of opening and washing out the abscesses. In one of the cases the colon was affected, while the appendix was not. In the other the

patient had had colitis for a long time. I was called in consultation and found an abscess present. The abscess contained air as well as pus, and had burrowed to such an alarming extent that the patient died. The appendix in this case was not involved.

The symptoms associated with appendicitis vary considerably and may be misleading, as the two following cases will show. I recall one case of the disease in a boy of fourteen years, with whom the temprature rached 105° He was delirious. On the third day after the attack the appendix was found to be gangrenous, but not perforated. It was easily removed, and the boy made a prompt recovery.

Quite recently I was called to see a young man who was indisposed on Thursday; on Friday he was distinctly ill. About twelve o'clock on Saturday, forty-eight hours after the attack became well marked, the temperature was 102°, pulse 120. Operation was made at four o'clock that afternoon. On opening the abdomen I found that the appendix had ruptured, although he at no time manifested any prominent symptoms that would lead to the belief that the case was one imperatively demanding immediate abdominal section.

I believe, in many cases, that if we wait and watch for the manifestation of symptoms sufficient to satisfy the surgical ideas of some physicians the patient will die.

In many of these cases we are guilty of the sin of omission. We neglect to operate on the cases that are brought to us until they develop so-called well-defined surgical symptoms; then the chances are we will encounter a straight case of general peritonitis, and my experience has taught me that such cases do not get well. We operate on them during this critical stage; they die. The mortality-rate is high, instead of being about 2 per cent., as it ought to be when the cases are operated on early. The whole community becomes alarmed at the great mortality following late operations for this disease, and the next man who gets appendicitis declines to be operated on; he prefers medical treatment. The sin of omission on the part of the surgeon costs the patient his life. The question arises, How much is the surgeon responsible for that loss of life?

Dr. A. J. Coley, of Alexander City, Ala.—I have been very

much interested in the papers that have been presented to us on appendicitis, and my experience coincides with that of the authors. I think Dr. McRae is mistaken in regard to what Dr. Deaver says about sixteen cases out of four hundred getting well without operation. Although it is given in Dr. Deaver's recent book on *Appendicitis*, some one else makes this statement. Dr. Deaver favors operation first and last. Whenever he has a case of appendicitis he does not wait for suppuration to take place, but operates at once. We know that the appendix in some cases will twist upon itself and slough, and the cases that contain a foreign body will ulcerate on the outside. I have seen six cases of the disease, and I believe patients should be operated on as early as possible. If we wait for evacuation of the bowel, we wait for the patient to die. In country practice we are sometimes called too late to do any good by operation. The patient attacked with the disease may live perhaps several miles from any physician, and by the time the physician arrives rupture of the appendix may have taken place. It strikes me the keynote is to teach the country practitioner how to diagnosticate these cases early, and if he is not sufficiently skilful to operate upon the patient himself, he should send for a surgeon. I am satisfied that if this plan is carried out the mortality from operations from this disease would not be 18 or 20 per cent.

Dr. A. M. Cartledge, of Louisville, Ky.—If we follow the advice of the essayists in operating on all cases of appendicitis as soon as the diagnosis is made, we should make few mistakes. The questions of diagnosis and the proper technique in the execution of the operation are the only problems that especially concern us. Many physicians are inclined to believe that we should divide our cases into different classes, according to their symptomatology; but so far as the treatment is concrened the question becomes very different. I have changed my opinion several times in regard to this disease. The more cases of appendicitis I see and operate on, and the more experience I have, the more I am inclined to believe that we should operate on every operable case as soon as the diagnosis has been made. My first impression, after seeing a great many cases of appendicitis, was that they would probably get well without operation, and that we should wait and watch, as some of the preceding speakers

have indicated; but I soon found out that the waiting and watching policy amounted to nothing, for the reason that we do not know when the appendix has ruptured—at least I cannot tell. I have made grievous mistakes in the past by waiting, although I have seen my patients every hour or two personally, or else they have been under the observation of an excellent physician. I have operated between seventy and eighty times for this disease, and have seen altogether about one hundred and eighty cases. I speak carefully about this matter, because I have have gone along this road. As I have previously said, I have changed my opinion in regard to the disease before this and other societies. I have seen cases apparently get well without operation. The great trouble is that each side of the subject presents statistics from their standpoint, and if we ascertain the truth in the matter we will have to accept a part, and part only, of the statistics from each side. If any of you could say that of four hundred people attacked with appendicitis only sixteen would get well if not operated upon, or only a hundred would get well if you did not operate on them, it would carry no conviction. We know such is not the case. Nevertheless, that does not alter the fact in determining how the case is going to terminate. My experience leads me to believe that safety lies in early operation in every case. But if you decide from your experience that it is better not to operate on every case of the disease, and you believe you can carry it through by saline purgatives, rest, and a mild diet, and probably opium, if you deem it necessary, I will call your attention to one or two symptoms that are very valuable, and these will nearly always indicate the probable termination of the case. No one has called attention to the fact, all things being equal, that the pain at the beginning of appendicitis is of the greatest significance. In those cases that begin with agonizing pain from the onset of the disease it is better to operate at once, because, as a rule, they will terminate in suppuration. They are cases with so much retention from stenosis at the base of the appendix that secondary rupture will take place. Another symptom to which our attention has not heretofore been called, but which I have learned from two recent cases, is absence of rigidity of the muscles on the affected side. These are the cases in which there is a twisting of the appendix identical with that

encountered in strangulated hernia, but there is no muscular rigidity as in strangulated hernia. Given a patient seized with agonizing pain in the right side, or, for that matter, referred to the umbilicus, without the usual muscular rigidity, and we have the most deceptive cases of the whole series. The patient has a severe colic; the next day—sometimes within three hours—the pulse skips from 90 to 130. I saw a friend six times in one day during an attack of appendicitis, and as the symptoms were not severe we waited and watched his case until torsion of the appendix had taken place and it was too late for an operation to do any good. I operated on him, but he had already absorbed sepsis enough to die. The appendix had ruptured from strangulation. The man became quiet as soon as necrosis had taken place. This instructive case influences us to change our mind about waiting. We must array ourselves for or against immediate operation. A physician would say, "I will wait until the patient gets through the first attack, and run the chance of his dying, and operate in secondary or relapsing appendicitis." The logic is not very good that would make a man willing to operate for mild, recurring appendicitis and not do so in the primary attack. If we study this question from every standpoint, we will have no good reason, it seems to me, for waiting.

Dr. George Ben Johnston, of Richmond, Va.—This subject is of so much importance that I do not feel I can remain silent. Dr. Gaston asked whether there were any enteroliths or foreign bodies found in amputated appendices. Personally, I do not think foreign bodies cut any figure in the production of appendicitis. For a long time I was a teacher of anatomy. I made a great many dissections and found numerous appendices that were filled with hardened fecal matter, but no appearances of inflammation, and more recently I have operated on a great many cases requiring amputation of the appendix, and I have found hardened feces that seemed in nowise to be the cause of the inflammation. Once I found an ordinary birdshot in the appendix. I do not think foreign bodies are productive of appendicitis. The difficulty is usually in the circulatory apparatus of the appendix. There is some obstruction there from which the inflammation or sloughing, as the case may be, takes its origin. I have heard a number of gentlemen say that cases of

appendicitis should be watched. I should like to know what they mean by watching a case of appendicitis. I should like for any gentleman to inform me whether he is able to tell what case is going to rupture, what abscess is going to open spontaneously and discharge itself into the abdominal cavity by any process of watching. I have never been able to determine this, and if any member knows when such a thing is going to occur I shall be glad to have him communicate that information to me.

In reference to operations for appendicitis, I think we should, for the sake of statistics, divide operative procedures into two classes. First, those performed for malignant inflammations or fulminating appendicitis; and, second, those done for recurrent appendicitis. If we are to operate upon recurrent cases, and have the opportunity to do so, undoubtedly it is better to operate between attacks. When this is done the statistics will be better than Dr. Johnson has quoted—one death in seventeen cases—as reported by Dr. McGuire at the meeting of the Virginia State Medical Society. It has been said that no surgeon is justified in losing more than 2 per cent. of these cases, and therefore the gentleman whose statistics the Doctor quotes must operate on thirty-three more cases without a death before his statistics are worthy of quotation. In cases where pus has already formed it is imperative that we should proceed promptly. If the abscess-cavity has reached the anterior abdominal wall, and we are given an opportunity to operate upon it merely by incising the abscess, the case is a simple one. In such an event it is dangerous, in my opinion, to make a diligent search for the diseased appendix. The appendix will take care of itself. We should merely incise the abscess, drain it well, and allow the diseased appendix to take care of itself, which it will usually do. If, however, matter has formed, and such a favorable direction has not been given to it as in those cases where the abscess is small and not capable of reaching the anterior abdominal wall, the case is different. Here we would cut down upon the diseased appendix, wall off the tissues carefully with proper protective sponges or gauze, then remove the diseased appendix and such necrotic tissue as can be found. In such a case the diseased appendix should be carefully removed, but not so in cases where the abscess is approachable without trespassing upon the uninflamed or normal peritoneum.

My experience has been like that of every gentleman in this hall, namely, I have procrastinated and delayed operating on certain cases which I believed would terminate favorably, and have seen such cases die before relief could be afforded them. Therefore, I am of the firm conviction that the most prompt measures should be adopted in the treatment of appendicitis; that an operation should be done just as soon as the diagnosis is made, provided it is made within the first forty-eight hours of the attack. In doubtful cases an exploration should be resorted to to determine the nature of the malady and to complete the operation, if necessary. A physician, in my opinion, has but one duty in the matter of dealing with appendicitis, and that is to promptly call in a surgeon of experience and not undertake to treat cases medically. There are, of course, numerous cases medically treated which recover. There are other cases which recover without treatment, but the best results are procurable by surgical interference.

Dr. N. P. Dandridge, of Cincinnati, O.—I have very little to say after the thorough discussion which these papers on appendicitis have elicited. I find myself, with increasing experience, tending toward earlier operation. At the same time there are a considerable number of cases in which I do not advise operation. I have often found it very difficult to decide exactly what it is that urges me to determine on operation and to classify these cases in a satisfactory manner. I can agree almost entirely with what has been said in regard to the necessity for operating, particularly in those cases that commence abruptly with intense pain, even though the pain subsequently subsides and the patient goes on, apparently improving; the fever subsides and pulse improves, but there still remains some induration in the side. These are the cases in which the operation should not be postponed. I have seen quite a number of such cases in which after the fourth day the improvement had begun, everybody was satisfied and supposed danger was passed, when suddenly the former condition would flare up, and in the course of the night the patient become almost helpless. I cannot agree, however, altogether with the idea that we should not operate on apparently desperate cases. I think we will save some of them, and are bound to give them the benefit of a chance, and the arguments that have been used

against the pursuance of this course should not influence the surgeon; but in the presence of disease our duty is to deal with the case before us. Some of my most desperate cases of appendicitis, where it seemed apparently there must be general peritonitis, have gotten well. We cannot discriminate sufficiently close between the comparatively mild and desperate cases, and the desperate cases demand our efforts just as well as those that are more favorable.

In regard to pus cases, I do not think it is wise to search for the appendix very much, but if it can be found easily it should be removed. I feel satisfied in a great many cases with evacuating the pus, irrigating the cavity gently, and packing it with gauze.

Dr. F. W. McRae, of Atlanta, Ga.—I wish to put on record my statistics in regard to appendicitis. I have seen between forty-five and fifty cases of the disease, and I have operated on fourteen, and the mortality has been *nil.* Most of the cases were operated upon from a week to ten days after the inception of the attack. Three of them were operated on in the interval. In three of them there were sloughs in the colon, with fecal fistulæ following. I wish to ask the gentlemen who took part in this discussion to state if they do not see some favorable cases operated on die, as well as some of the apparently favorable cases that die without operation.

Dr. R. B. Rhett, of Charleston, S. C.—I have operated twenty times for appendicitis, and of that number I have lost one. In this case I opened the abdomen at one o'clock at night, found that the sac had ruptured, washed out the cavity, and the patient died. I would have been glad to have heard the experience of some of the members as to the location of these abscesses or inflammations with reference to the intestines, and whether the method of operating was right. It so happened that about two weeks ago I operated on a case in which two or three coils of the small intestine were found agglutinated between the abscess sac of the appendix and the abdominal wall. I saw Dr. Wyeth operate in New York last fall, and was struck by the great care and caution with which he approached these abscesses. In my case I was exceedingly cautious in dissecting very slowly, and by so doing I avoided entering the intestines. If I had cut

boldly, as many of us do, I would have entered the intestine, and possibly would not have reached the abscess on account of its being so small. Fecal matter in the intestine will probably disguise the fact of the abscess being behind. The incision in this case was made about a third of the distance between the anterior-superior spinous process and the umbilicus. My experience has been that it is better to enter the cavity to the outer side nearer the ileum than to the umbilicus. I think it is safer and we are less apt to get into the general cavity. I think it is a great mistake, where we have the formation of pus, to attempt to search for the appendix. The danger of breaking into the abdominal cavity, and in that way poisoning the patient, is too great.

In my cases I have abandoned the use of packing with gauze. In one or two of them I have noticed a rapid rise of temperature, and on removal of the gauze a good deal of pus would be liberated and the temperature would subside. I am now in the habit of using one or two drainage-tubes of large size, and have had no trouble since in those cases. The case I spoke of in which the coils of intestines were in front, after the seventh day a fecal fistula was established. I agree with Dr. Cartledge and others who have spoken, that where we have all the facilities for perfect asepsis, as soon as the diagnosis is made it is wise and best to operate.

Dr. W. D. Haggard, Jr., of Nashville, Tenn.—I desire to emphasize the point Dr. Rhett has made, which hitherto seems to have been overlooked, namely, the important addition to the operative technique in appendicitis as devised by Dr. McBurney. In addition to the incision passing through the muscular planes by separation of muscular fibre, instead of division, the main reliance in the efficacy of this method to prevent ventral hernia is in the suturing. After uniting the peritoneum and transversalis fascia with catgut, the internal oblique muscular fibres may be approximated with one or two sutures. The tendinous fibres of the external oblique, which constitute the main bulwark against hernia, are sutured separately with catgut, the skin having a separate layer, comprising altogether three layers. By this method union is perfect. I had the pleasure of seeing these cases under Dr. McBurney, and shortly after their recovery, after they had gotten out of bed, there was no induration about the incision ;

there was perfect union, and his percentage of hernia has been reduced to a minimum.

While it seems to me that everything has been said in reference to operations in pus cases, still there is one point I desire to add, and that is in our efforts to prevent contamination of the peritoneal cavity when we open abscesses of appendicular origin that are not adherent to the anterior abdominal wall or are not perfectly walled off. I have been very much impressed with the technique of Gerster. He exercises extreme care in placing gauze around the abscess sac, introducing it systematically in the abdominal incision and operating between the walls of gauze. He uses thick layers of iodoform-gauze, putting it all around so that it is absolutely isolated from the abdominal cavity, and then in the steps of enucleation there is no possibility of soiling the abdominal cavity. That is the essential danger. To further anticipate the danger of defilement, he uses smaller pieces of gauze, and his assistants are on the alert with dressing forceps to mop any pus that exudes; and in those cases he leaves the gauze in, it is practically open-wound treatment. I think it is the most essential technique that we can employ in pus cases.

Dr. De Saussure Ford, of Augusta, Ga.—I have not had much experience with operable cases of appendicitis; at the same time I do not believe I have made any mistake in diagnosticating some cases of the disease. My brother has had two non-operable cases of the disease, and has had no return for four or five years. I have assisted other surgeons in operating for this disease; I am disposed to think it is proper, as soon as the positive diagonsis is made, to operate. It is the logical thing to do, for the reason that when we have a trouble, the history of which is that it produces inflammation, and the result of that inflammation is the formation of pus, and following it there is danger of perforation into the abdominal cavity, inviting a general septic peritonitis, it ought to be treated by operation.

Dr. W. E. B. Davis, of Birmingham, Ala.—As the subject has been so thoroughly discussed, I shall have very little to say. The surgeon does not, as a rule, see cases of appendicitis on the first day, but usually some days after the attack. If we are called on the third day after the attack, and the case has been one of rupture with general peritonitis, to operate would

give the patient but little chance. I think there are but few cases of appendicitis that give rise to general peritonitis, or that would do so, in which the surgeon can do any good, because he sees the cases too late. It is hard for the family physician, even though he recognizes the condition, to persuade a patient to be operated on within the first twenty-four hours, and unless these cases are dealt with surgically within twenty-four or forty-eight hours we will not save them. The cases of appendicitis which result in general peritonitis that are saved are so few that we may almost eliminate them from the discussion. If you see a case on the third day that can be saved by surgery it can be saved at the end of five or six days, as rule. We may emphasize the danger of this disease and discuss the importance of operating at once, yet the question resolves itself into this, that if we see the case two or three days after the attack we can just as well wait a few days before operating. I do not advise that course, still I believe we can save about as many cases by waiting that length of time. The danger of the operation is less by waiting, because the adhesions have become more secure, the protection is more satisfactory, and we will have a simple abscess to deal with. It is best not to operate on the very mild cases at the time of the first attack, where there is no temperature to speak of, only a little pain, and the patient is able to walk about. A very prominent surgeon in Detroit diagnosticated a case of appendicitis. The attack was a mild one, but he was one of those who taught that in every case an operation should be done at once. He took that position in a family in which there was a young girl who had the disease. He told them there was great danger in delay. He was very earnest in his desire to operate. The members of the family were greatly shocked, and it set them to thinking. They called in a homœopath to investigate and treat the case, and under medical treatment the patient got well. We can readily understand how such an instance as that would keep others from being operated on. If we insist on operating on every mild case of appendicitis and upon cases of general suppurative peritonitis, we are going to bring surgery into disrepute. I take it that when we are called on the second or third day of the attack it is often a very difficult question to settle whether it is best to operate, because we cannot say whether we are going

to have an abscess or whether the patient already has general peritonitis. If we operate and find general peritonitis we know the patient is going to die, and the operation, therefore, will be recorded against surgery.

I am glad that Dr. Cartledge emphasized the fact that a great many physicians fail to distinguish between a localized and a general peritonitis. One or two of the members at the Charleston meeting of this Association took the position that cases of general suppurative peritonitis could be operated upon and emptied of a gallon of pus, and the lives of the patients saved. Although such cases may appear to have been general peritonitis, they evidently were not. My experience has taught me that no patient can possibly live with a general septic peritonitis that has produced that quantity of pus. While some good surgeons claim to save cases of general suppurative peritonitis where there is a large quantity of pus in the abdomen, I believe the explanation is to be found as pointed out by Dr. Cartledge, namely, that surgeons fail to differentiate between local and general peritonitis. While it seems that we should formulate some rules for our guidance in coping with these cases, yet the more we study the subject the more difficult it becomes, and we find that every case is a law unto itself. In all cases of appendicitis, where the pain is severe, if the patients can be seen on the first day, we should operate. In all cases in which there is a second attack of the disease, an operation ought to be done whether the attack is mild or severe.

Dr. George A. Baxter, of Chattanooga, Tenn.—Before Dr. Brokaw closes the discusson I would ask his opinion in regard to cases of obliterating appendicitis. These cases recur, as Dr. Davis has said, but with less severity each time, indicating that the disease is absolutely limited to the appendix. I would like to hear Dr. Brokaw's opinion on that subject. I have two cases in hand now.

Dr. Brokaw (closing the discussion).—I am glad that my paper has elicited a good deal of discussion. In answer to Dr. Baxter, I will simply say that the obliterating form of appendicitis which he speaks of is nothing more nor less than the relapsing form; as a rule, the growling cases that have been referred to. We find at the post-mortem examination an appendix with

the canal practically obliterated, completely or at certain points, and this would explain the cases referred to by Dr. Baker.

Several of the speakers have spoken about the watching and waiting. For what? You surely do not wait for the formation of pus. Do you wait until peritonitis has commenced to develop, until the patient is overwhelmed with septic matter? You certainly do not, if you do what is proper. The ideal thing is to operate before great pathological changes have taken place. The man does not live whose diagnostic ability is so great and exact that he can sit at the bedside of any patient with appendicitis and say: we can afford to wait. I do not think we are doing our patients justice by dallying with them and delaying operation from day to day. Waiting and watching do no good. If we are going to operate, let us do it. We should not wait until gross pathological changes have taken place. Procrastination brings surgery into disrepute.

When I left St. Louis last night to attend this meeting I left two patients in bed who had been operated on for appendicitis, one on Saturday morning, the other Sunday morning. In neither of these cases was there any great pathological changes. One case illustrates beautifully how a pathological lesion of gravity can take place, namely, the appendix was on the point of rupture, and yet in opening the abdomen there was no rigidity of the abdominal muscles. There was pain at what is called McBurney's point, which point, I might say, varies according to the position of the appendix. I made a diagnosis of appendicitis, operated, removed the appendix, and on first looking at it it simply showed a little thickening. On looking at it more carefully, and examining the mesenteric border, I found there was ulceration going on, and possibly in two or three hours the appendix might have ruptured, as there was only a little thin diaphragm which separated the contents of the appendix from the peritoneal cavity. There were no adhesions. The intestines surrounding it were injected. This little point, not bigger than a split-pea, would likely have ruptured, with escape of the contents into the abdomen.

Dr. McRae has been quoting the statistics of English authorities in reference to appendicitis. I highly value the opinion of Mr. Treves. I likewise value Mr. Tait's opinion, but Mr. Treves

looks at this subject through English glasses. We do not. I do not think that the treatment of appendicitis has reached the stage in England that it has in America. The one point I would impress upon you is that we should operate early, before pus has formed. Do not wait for perforation to take place. I waited for perforation to occur one time. I told a physician I would meet him in the evening, as there was to be a consultation over the case. I went that evening, to meet the undertaker. The conversation was a brief one, and was held on the doorsteps.

In regard to the differential diagnosis, I admit it is difficult to distinguish a case of tubal or ovarian disease from appendicitis, but we will find, as Dr. Kelly has said, cases sometimes in which we have both tubal and appendicular trouble. It is a strange thing, and yet it is a fact, that appendicitis and pus cases run together in a number of instances.

Dr. McRae says he does not believe that every case is a surgical one. I take just the opposite view. I speak from experience, and really believe all cases are surgical. It would be a good thing if everyone of us were to look at the subject from a pathological standpoint, and knowing the pathology we know what to expect so far as the ultimate result is concerned. The tendency in some cases is toward recovery. And I admit that a number of cases recover without operation. I will grant that 90 per cent. out of every 100 cases get well without operative interference, but I am after the minority, the mortality of which we can reduce to 3 per cent. by opening the abdomen early, but which at the present time is from 7 to 10 per cent. by the so-called medical treatment.

Dr. Goggans (closing the discussion).—I thank the members for the generous discussion of my paper. I regard appendicitis as one of the most murderous of all diseases, one that is alarmingly common, and consequently, perhaps, the most important of abdominal lesions that are engaging our attention to-day.

As to the statement made by Dr. Davis, that we can save a patient on the fifth or sixth day, as well as on the second or third day, I cannot agree with him. It seems to me we would incur unnecessary risk. If we have tenderness and rigidity of the muscles, and make a diagnosis of appendicitis, then we should immediately operate. I am of the opinion that in many cases

that recover without operation the diagnosis was incorrect. Some of the speakers have said that when a case has terminated in general peritonitis the patient must necessarily die. I do not believe that. I stated in my paper that we should operate invariably in every case unless we knew that the patient was going to die. If I had appendicitis or peritonitis supervening upon appendicitis, I should demand an operation, even if it had to be done under local anæsthesia. If I were so low that I could not stand general anæsthesia, I would ask the surgeon to open my abdomen and wash it out.

As to the facilities for asepsis, we have already sepsis to deal with, and I think we should go about making everything aseptic and deal with the condition before us promptly, and not hesitate for fear of bringing surgery and our reputations into disrepute because of unhygienic surroundings. The other day I had to operate on a man who had mastoid disease, and I mention it because I cannot think of a place that was any more unfavorable than the room in which I operated. It was very small, contained three beds, and away out in the country. I made a temporary table on the bed on which he was lying, did the operation, and he is now on the road to recovery.

As to the propriety of making exploratory incisions in order to make a diagnosis, I do not believe the experienced surgeon would hardly ever think of doing that, because when he operates at all, he would be certain to cut down upon the diseased appendix.

As to the time to operate, it is a good plan first to unload the bowels in a case of appendicitis of mild severity, and in case this unloading of the bowels is not followed by a decline in the temperature with symptoms toward recovery, then I would operate.

COMPOUND COMMINUTED FRACTURE OF THE RADIUS AND ULNA, NEAR THE WRIST-JOINT.

By H. M. Hunter, M.D.,
Alabama.

I will merely relate to you a short history of what I have found to be so rare a fracture that diligent search fails to find another similar one on record.

I have taken the trouble to search the following works on surgery: Treeves', Ashhurst's *Encyclopædia*, including the seventh volume; Dennis's *System of Surgery*, the latest edition of an *American Text-book of Surgery*, Erichsen's, Agnew's Wyeth's *Surgery*, and *Surgery by American Authors*, gotten up by Prof. Roswell Park. These works, with some fine journals, were all the literature at my command. I wrote a number of very able surgeons, whose skill and intellectual attainment deservedly place them at the head of the surgical world, such men as Drs. Wyeth and Lewis A. Stimson, all of whom wrote me they knew of no such fracture. The books and journals I read so carefully abounded in all other sorts of fractures but the one like mine. There is nothing new under the sun, it is said, and, should I report a fracture familiar to some of you, I humbly beg the pardon of the Association, and with becoming chagrin turn loose my golden bird and fall back upon my result in this case to redeem me.

I believe it was the elder Gross who said he never approached a fracture of any sort without fear and trembling. In this short expression is crystallized a great truth, and no

surgeon possesses the acumen to know what interference might occur to prevent or prolong the healing process of any fracture he is called upon to treat.

Now, with these few preliminary remarks, which I deem necessary to impress you with the fact that I thoroughly appreciate the dangers attending fracture, I shall briefly relate the history of the fracture which is the subject of this paper.

On July 29th last, during that extremely hot weather that spread over the whole country, I received a telegram from Captain N. to come at once to see one of his boys, who had sustained a fracture of the arm. I was out, and the message was delayed quite a time. The train having gone, it was necessary to drive through the country, a distance of nine miles. I at once proceeded to add a few articles to my surgical satchel, one article especially being a thin sheet of beech or basswood, which I intended to use as a splint. When everything was ready, and not knowing the variety or complications of the fracture, Mr. C. M. Franklin kindly accompanied me, he being a student of the College of Physicians and Surgeons of New York for several years. The patient was robust, healthy, ten years of age. The fracture was caused by a heavy green stick of timber falling directly upon the arm, thus being a direct fracture, which is unusual in a young subject. The fracture had occurred six hours before I reached the patient. Without boring you with the ordinary details of making everything aseptic, my splint accurately measured on other arm, and put in hot water so that the splint would mould itself accurately to the injured arm, I inspected the arm closely. It was a compound fracture of the right forearm, with a spicular of the ulna slightly protruding; this was one inch and one-half from the wrist-joint; the soft parts immediately and for some distance surrounding the seat of fracture were terribly bruised. When I grasped the arm, I felt that the radius also had been fractured. I had very little trouble in reducing the protruding fragment of the ulna, and followed the opening with my finger. To my surprise, I found the ulna broken into three fragments, and the radius also frac-

tured into three parts, or rather two fragments had fractured off the end of the radius.

I succeeded, by my finger within the wound and my other hand on the outside, in reducing the fragments very nicely to their natural position. I flushed out the wound thoroughly with 1 to 5000 bichloride of boiled water; I washed his hand and arm to the elbow in the same solution; again held his arm myself until Mr. Franklin padded with cotton the one rectangular splint for me, and I then turned the arm over to him (the boy's father administered the chloroform during this brief period). I introduced a drainage-tube, dusted the wound with iodoform, placed over the whole iodoform-gauze, covered gauze with absorbent cotton, and placed around this some large rubber tissue, intended to be inserted under the first bandage to protect the other bandages from all discharges. I again assured myself that the arm was in proper position, measured both arms to see that the fractured arm had the proper extension, and by a method I have never seen mentioned, and one that I have used for several years and know to be absolutely correct, I easily ascertained the position of the arm. If the arm is to be placed in supination, the thumb must be on direct line with external condyle of the humerus; if between supination and pronation, the thumb must be on direct line between both condyles; if placed in full pronation, the thumb must be on line with the internal condyle.

I placed this arm in the position of semi-pronation. The splint was perfectly pliable, and moulded itself to the arm beautifully under the pressure of the bandages.

There was nothing of special interest in the process of healing. I dressed it carefully when necessary. I removed the bandages and examined the wrist three weeks after the receipt of the fracture for fear of anchylosis of the joint; I did this several times and gently moved the wrist. The middle of the fourth week I removed the bandages and examined the arm for supination and pronation, and greatly to my delight and surprise I found proper movement between the bones. Six weeks later I discharged him with as good use of

both wrist and arm as ever. I will repeat there are three special points with regard to this case:

First, there has never been reported a similar fracture.

Second, I have never read nor heard of the method I have described to reduce the fracture of the forearm.

Third, I have never seen nor read of such perfect results as were gained in this case, the wrist having perfect motion, and more wonderful and even miraculous, as Dr. Stimson wrote me, there is absolutely no interference with supination and pronation.

DISCUSSION.

Dr. N. P. Dandridge, of Cincinnati, O.—The case reported by Dr. Hunter has certainly been followed by a most admirable result. Undoubtedly cases of this nature are very embarrassing to treat, and are very often followed by decided diminution in the function of the forearm. Union between the radius and ulna very frequently takes place, of course, destroying pronation and supination. The special point in managing fractures of both or one bone of the forearm is to use a splint sufficiently broad, so that there is no lateral pressure upon the bones to interfere with approximation. There is more difficulty than would appear at first thought in getting the bones in proper position. Of course, it is easy to effect the lower fragment by means of movements of the hand. It is not so easy, however, to follow this by the movement of the upper fragment, as the muscles which produce pronation and supination being attached high up act both in supinating the upper fragment of radius and at the same time flexing it somewhat, and there is difficulty in controlling this. The treatment adopted by the doctor was very rational and efficient, as shown by the successful result he has attained. He is to be congratulated upon the excellent result in this case, in that he has completely restored the function of the arm, and particularly the important function of rotation and pronation. I do not remember to have met with a similar case in my own practice.

Dr. James McFadden Gaston, of Atlanta, Ga.—I do not know that I have anything in particular to add to Dr. Hunter's case. His paper was explicit in references to the description of

the conditions, and I suppose the peculiarity of the case is that it is one of multiple fracture. I think it is rather unusual to have a case of multiple fracture of the radius and ulna involving both bones and being attended with the satisfactory results which have followed the doctor's treatment. It is difficult to accomplish what we aim to do in ordinary fractures of both of these bones to preserve the interosseous space in simple fracture, and the difficulties are still further enhanced where a multiple fracture occurs. It strikes me the doctor has secured an admirable result in the treatment of the case.

Dr. John D. S. Davis, of Birmingham, Ala.—I was very much interested in the report of Dr. Hunter's case. I have never seen this exact fracture in my own practice, and I do not remember of having seen one reported. I took occasion to look the matter up after seeing the title of the doctor's paper, and I was unable to find any record of such a fracture. I have had a comminuted fracture of both bones, due to gunshot wound, but not this character of fracture, which has complicated the joint, and while I got ankylosis, I had as good a result as could be expected under the circumstances. He was a countryman, who had been hunting early in the morning, and in walking along the gun struck a log and was discharged, shooting him through the wrist.

I recall a case of compound comminuted fracture of the lower third in a railroad man in which I secured a good result, but it was not the exact character of fracture reported by Dr. Hunter. I treat all fractures of the forearm (Colles's or Barton's fracture), where the displacement is angular, rotatory, or otherwise, with one common dressing, namely, plaster-of-Paris, which is carried from the fingers up above the elbow. (Here Dr. Davis demonstrated his method of treating these fractures with plaster-of-Paris.)

Dr. R. B. Rhett, of Charleston, S. C.—I have only had a limited experience in the treatment of fractures of the radius and ulna, and the treatment I have usually pursued is that which has been outlined by Dr. Dandridge. I have had no experience in cases of multiple fractures of both bones of the forearm. My results have been very good in those cases that I have treated. I had one case, a young man, who was very muscular,

in which after the splint had been kept on for five weeks it was taken off, and it had been removed previously for passive motion, and a week afterward he came to me with the arm bent like a bow. The anterior muscles were very much stronger than the posterior, so much so that the bones had given way and bent, union being somewhat soft. Of course, I was quite surprised, I wanted to put him under the influence of chloroform, but the man preferred me to treat it without doing that. I took his arm against my knee and straightened it out and put on another splint, and the arm remained perfectly straight afterward.

In these multiple fractures we have to be careful in keeping the bones apart, and I suspect in Dr. Hunter's case it must have been a direct fracture across, the bones assisting in holding the fragments in position; otherwise I think with the contraction which takes place under the plaster-of-Paris splint it is difficult to prevent the muscles in front and back from drawing the upper and lower fragments together, keeping them so accurately straight as to prevent any approximation of the two bones.

I was pleased with Dr. Davis's method, and shall be inclined to try it, as I have never thought of compressing plaster between the bones in the way he has demonstrated.

Dr. Bacon Saunders, of Fort Worth, Texas.—I think Dr. Hunter's case is more interesting from this point of view than from any other, namely, that with our modern technique of managing fractures we need not lose hope in saving the limb, no matter how great the injury. I believe, so far as my knowledge, reading, and observation go, that the doctor's case is perhaps unique in the exact location and character of the fractures. We know that in this class of direct fractures they assume any form, and can hardly be classified when due to direct violence, as was the case in the doctor's patient.

In regard to the dressing of these cases, the plaster-of-Paris, as described by Dr. Davis, is an admirable dressing for those who are adepts in using it; but unless a man is in the habit of working the plaster, unless he understands exactly the material he has in hand, he had better use some other splint or apparatus. The average man, who does not treat these fractures daily, who does not manipulate the plaster every day or so, had better trust

to an apparatus of a different kind. The dangers of plaster in fractures of the forearm are well known and very great. I do not understand exactly how Dr. Davis is able to inspect the seat of fracture so well with so little disturbance to the limb. I have had considerable experience with the use of plaster. I use it almost daily, but I must confess I have not been able to remove it with such a great amount of ease and with so little disturbance of the parts as to enable me to inspect the local condition with such security as Dr. Davis seems to do. Personally, in the great majority of cases of fracture of the forearm or of the upper extremity, I do not use plaster any more, being better satisfied to use lighter and simpler materials that have to a certain extent the same property of being moulded to the inequalities of the limb. There is no special treatment which can be adapted to all of these fractures. In the treatment each case is a law unto itself. While Dr. Davis might be satisfied, and perhaps it is best for him to always use plaster, and while Dr. Baxter will use his broad splint, I think for the individual physician the idea is to use that apparatus in those cases with which he is most familiar and that he knows best how to handle, and not think because Dr. Davis, Dr. Saunders, or anybody else, has better results with a certain apparatus that he should use it. The physician had better use the apparatus he knows how to manipulate and uses in his daily practice. It will be safer for him.

Dr. Desaussure Ford, of Augusta, Ga.—I think Dr. Hunter is to be congratulated upon the successful treatment of his case, for in the treatment of fractures of the forearm the points that he considers of most importance are pronation and supination. I shall have only a few words to say in connection with these fractures. We very often see these multiple fractures in people who are injured in railroad accidents. I am not aware, however, that they occur exactly as in the doctor's case. I have had quite a number of cases of accidents by railroads to care for, where the lower end of the arm was in trouble—that is, where there was a comminution of the bones of the wrist, as well as of the lower end of the radius. All of you have seen these cases, and under those circumstances I got ankylosis as a result, if the wrist-joint was involved.

I wish to say a few words in regard to splints, agreeing with

the gentleman who has preceded me. Of course, every physician has his favorite method, and he will naturally adopt it. I am afraid of plaster-of-Paris bandages in fractures of the forearm, but I occasionally use it. I can convert a plaster-of-Paris bandage very quickly into a plaster-of-Paris splint, only I go further than Dr. Davis in this respect, namely, that instead of making one section I make two. We then have two splints, which are carefully and perfectly moulded to the parts by manipulation. At the time of the setting of the plaster, in order to try to keep the two bones separated from each other, in other words, the preservation of the interosseous space which, of course, we wish to preserve, I take a small, round broomstick, and, while the plaster is setting, I bind it over the anterior surface of the arm. After it is set I take this away, and we will have moulded perfectly and definitely the plaster in the interosseous space. That being the case, we have a perfectly moulded splint to the part. In this way we can readily inspect the fracture, either one side or the other. In the event the soft parts are broken we can have a window. If we are not satisfied, however, to have a window, we can take one splint off without disturbing the fracture, because the other half of the plaster-of-Paris splint is left intact.

I was rather concerned as to the location in Dr. Hunter's case. The location seems to me to be very near, according to his description, the pronator quadratus muscle. It is just at this part that the pronator acts upon the radius, and that, possibly with the assistance of his well-adapted splint, the preservation of this most important movement of the arm was secured. You can stay the action of this pronator muscle by the application of your splint, so that it would not interfere with the union of the fracture of the radius, nor jeopardize pronation and supination.

I consider this a very important subject, and I again congratulate the doctor on his successful result.

Dr. George A. Baxter, of Chattanooga, Tenn.—I did not hear the paper read, but Dr. Hunter told me something about his case. I notice that the discussion has turned upon the proper use of plaster-of-Paris in fractures of the forearm. I must confess that I am very fond of plaster-of-Paris, and I think the objections urged against it, namely, its weight and its interference with the circulation when put on too early, are easily remedied

by the manner of handling it and the incision. The great fault which most physicians make with plaster-of-Paris is to use too much plaster. I have never found it necessary to use more plaster than is contained in the meshes of the bandage itself. Three or four layers are ample and sufficiently strong for any fracture of the forearm, or for a fracture in almost any portion of the body. Incision of the plaster the whole length of the splint will guard against any interference with the capillary circulation during the progress of the swelling which takes place afterward. I never hesitate now, if I think it is necessary to do so, to put on plaster-of-Paris at any time following an injury. Incision also enables one to readjust the plaster after it is on. If your splint is not thin enough you can even, without incising a portion of it, overlap the edges and make it secure and perfectly adaptable to the condition which exists. But there is, to my mind, in fractures of the shaft of the bones of the forearm, a better splint yet, and that is the old one, perhaps the oldest we have—the anterior-posterior splint. Those of us who have used it know that it unquestionably overcomes the action of the pronators, radii, teres, and quadratus. Anyone who has used it and adjusted it carefully, as swelling goes down, and the arm is finally cured and he takes it off, he finds the muscles of the arm looking, as it were, flattened, the bones well separated, and the action of the pronators completely overcome. There will be no interference with the rotatory motion of the arm.

In fractures further down, near the wrist, Colles's, for instance, I think that they get well almost without treatment. All we have to do is to thoroughly replace the fragments; and there, again, is one of the features of our treatment, the Colles's fracture is frequently not entirely reduced, and sometimes it requires extreme effort to reduce the fragments and put them in the position of over-extension before flexion, to bring into position. With drop-wrist and a simple adhesive strap, in intelligent people, they will get well without trouble. Usually for the treatment of this fracture I have used plaster-of-Paris, or the so-called Levis's drop-wrist or moulded splint. For fractures above this point I usually prefer to use the anterior-posterior flat splints well padded.

Dr. John D. S. Davis.—Do you cut your plaster in front?

Dr. Baxter.—I cut it at the upper border. I use another bandage which is more suitable sometimes, for plaster-of-Paris will rub off, and that is silicate of soda. The bandage soaked in this solution makes a light splint, as light as can be had. It is also put on in the form of a roller-bandage, and can be incised precisely like the plaster-of-Paris. It is even more elastic than the plaster-of-Paris and is capable of any use that plaster-of-Paris is. The only objection to it is that it is very slow in drying. I usually delay putting on the silicate of soda bandage until after the swelling has subsided, or I put the anterior-posterior splints over the silicate until the silicate is dry, then take it off. The anterior-posterior splint is only applied to cover the time in which the silicate of soda is drying. I have never put on one of these silicate of soda splints without meeting the approval and commendation of the patient and friends, and if it accomplishes the purpose equally as well we make capital by the neatness and elegance of the dressings.

In compound fractures, in either silicate of soda or plaster-of-Paris, we have an advantage in being able to dress the limb thoroughly through windows at any point and in any way establish perfect drainage. In compound fractures, however, of the forearm especially, I think we interfere entirely too much. If we are thorough and complete in our first dressings and leave an opening for the possible necessity of drainage, with the drainage-tube perhaps carried through and through, that antiseptic washings may be had, we can leave but a small window and get better results. I realize in railway surgery, of which I have done my share, that it is sometimes impossible to secure an aseptic condition. The nature of the injury is such that dirt is ground into the tissues in a manner that no germicidal wash will reach all of the germs that have invaded the injured parts. There will be a little pocket somewhere that we are unable to reach. But even under such conditions as this, if we trim off that tissue which we know beforehand will die from malnutrition, we can usually reach the balance of the wound and make it aseptic, at least with a confidence in its asepsis that we could not do otherwise. I see no reason why, in these cases of severe compound injury, we should leave tissue which must necessarily slough off afterward. If our dressing is properly applied, then

there need be little interference afterward with the progress of healing in a compound fracture either of one or both bones of the forearm. I do not take it that these fractures of the forearm are apt to give much trouble. One chief point, and the only one, it seems to me, to guard against, is the preservation of rotatory motion of the hand.

Dr. H. M. Hunter (closing the discussion).—The object in writing my paper was simply to relate a case of unique fracture, one that has not been placed on record, so far as I know.

With reference to splints, I am entirely innocent of stirring up a discussion on the variety and utility of splints. I use any splints myself that will give me fixation and insure extension, it matters not what it is. In the case I have related I do not think a plaster-of-Paris splint could have been used, as the tissues were very badly bruised and lacerated. We would have to inspect the condition of the soft parts so often that it would be impossible to use such a spilnt. I had the arm wrapped around with an aseptic bandage covering the seat of fracture. I could unwrap this bandage as often as I saw fit, to see the condition of the soft parts and to know whether to amputate the arm or not.

REPORT OF A CASE OF TRANSPERITONEAL LIGATURE OF THE EXTERNAL ILIAC ARTERY FOR INGUINAL ANEURISM, WITH REMOVAL OF THE ANEURISMAL SAC.

By N. P. Dandridge, M.D.,
Cincinnati.

I have to report in the following paper a case of aneurism of the common femoral which was treated by ligation of the external iliac artery by opening the abdominal cavity, and then laying open the sac, and partly dissecting it out after ligating the superficial and profunda femorals. I should not consider the recital of a single case as of sufficient importance to engage the attention of the Society did it not illustrate some of the questions now pressing for solution in connection with aneurism of the extremities. The facts of the case are as follows:

J. W. B., aged thirty-nine years, colored, laborer, entered the Cincinnati Hospital September 26, 1896. He admitted having had rheumatism, and had syphilis ten years ago. He has had gonorrhœa twice, and is a moderate drinker.

In May, 1896, he noticed a "lump" in the left groin, which throbbed, and gradually attained the size of an egg, and for three weeks he was obliged to abandon his work on account of the severe pain. His knee was drawn up, and he could not walk. The tumor then became smaller, and he went back to work. Three weeks before entering the hospital, while carrying a hod up a ladder, he felt something "snap," or rather give way, in the left groin. He stopped

work the same day, and has been in bed ever since, with severe pain in the leg.

From the time of the "snap" the tumor has constantly increased in size, the knee has been drawn up, and he has been unable to straighten it, and the pain became so severe that he decided to come to the hospital.

On admission the knee was found drawn up to an angle of forty-five degrees and the power of straightening it lost, and severe pain complained of all the time.

In the left groin there was found a smooth elastic circumscribed pulsating tumor, five inches in the long diameter and three and one-half inches in the short diameter. The pulsations were expansile, and a well-marked thrill could be felt over the inner aspect.

The tumor occupied Scarpa's triangle and reached fully up to Poupart's ligament, and outward as far as the spine of the ileum, and with a stethoscope a distinct bruit could be heard over its entire area. No pulsation could be found in the anterior or posterior tibials at the ankle. It was evident from the condition present, and the history given, that we had to deal with an aneurism of the common femoral artery dating back probably to the accident in May, some six months, and which had become diffused at the time of the second attack, three weeks before the patient entered the hospital. The man was kept quiet in bed, on low diet, and iodide of potassium given. The swelling, with the transmitted pulsation, continued to increase steadily upon the outer and upper aspect, until it reached above and beyond the anterior superior spinous process of the ileum, and the pain continued severe. It was thus apparent that immediate operative interference was required. It was equally evident that ligation of the external iliac would be necesary to control the current of blood into the sac, as the aneurism involved the end of this artery as well as the common femoral. It was further apparent that the ordinary extraperitoneal operation by an incision above and parallel to Poupart's ligament was out of the question, as the pulsating swelling had already reached above and

beyond the anterior spinous process and had invaded the illac fossa. It was decided therefore to apply the ligature from within the abdominal cavity.

October 5th, seven days after admission, under ether anæsthesia, the median incision was made, about four inches in length, with the man in the Trendelenburg position. The external iliac was easily located by its pulsation, and an incision through the peritoneum an inch or more in length on its outer side readily exposed the artery, so that an aneurism needle armed with kangaroo-tendon was passed from within outward, and the vessel secured. Pulsation in the tumor at once stopped. The opening in the peritoneum over the iliac artery was closed by a fine silk suture, and the abdominal wound then closed.

An incision was now made, some six inches in length, reaching from above to a point below the swelling in the groin. When the sac was reached it was exposed by reflecting the overlying tissues by the handle of the scalpel. A free incision then laid open the aneurism from top to bottom. A large amount of fluid blood gushed out at once, leaving some laminated clots, and exposing the fibres of the pectineus behind, showing that the sac had given way. The cavity thus made by the escaping blood reached well into the iliac fossa. Free hemorrhage at once occurred from below from the openings of the superficial and profunda femorals, which were both within the area of aneurismal dilatation, and from a small vessel above. A probe passed from the opening in the sac-wall located the superficial femoral in the matted tissue below and enabled us to pass a ligature around it, but in doing so the vein was wounded, and it became necessary to secure it by a ligature which included the artery as well as a considerable mass of tissue.

The profunda was isolated and secured outside of the sac, and the bleeding-point above secured by hemostatic forceps, which were left in place for two days. As much as possible of the sac was then separated by blunt dissection and removed. A third of it was probably cut away. The wound-cavity

was packed with iodoform-gauze, which was brought out at the lower end of the incision, which was then closed by suture and the entire limb wrapped in cotton. Following the operation there was a good deal of numbness complained of in the leg, and it became necessary to use the catheter for several days.

The abdominal wound healed by first intention. The wound over the tumor healed except at one point in the middle and the point where the gauze drain came out. On the fifth day a serous oozing escaped from the first of these openings. This subsequently became purulent, and, as the pus came from a pocket which could not be drained, the man was again placed under ether and the cavity laid open.

November 5th, thirty-one days after the first operation, the remnant of the sac was found in a sloughing condition, and there was a quantity of pus which had dissected out a cavity of large size. This was drained by a counter-opening upon the outer aspect of the thigh, a drainage-tube being passed through to the front incision. The wound was left open, and the whole cavity was packed with strips of gauze. The discharge now rapidly diminished.

Present condition, January 4, 1897, three months after ligation. The discharge continues from the incision. There is complete anæsthesia over the anterior aspect of the thigh as far down as the knee, and paralysis of the extensor muscles, so that the leg cannot be extended on the thigh, and in consequence the man cannot yet use the limb in walking. It is probable that some branches of the anterior crural were cut in laying open the sac. The use of the limb is improving under the use of electricity.

In commenting on the course adopted in this case, the following points should be made prominent: Ligation of the iliac artery was clearly necessary, as no form of pressure offered any chance of success. The invasion of the iliac fossa by the dissecting blood made it probable that the aneurism itself would be opened by the usual extraperitoneal incision for ligation of the extenal iliac. It was therefore deemed

necessary to secure the artery by opening the abdomen. The median incision was chosen as it would give freer access to the artery, so that the ligature could be placed as high as needed, and, further, because it would be further away from the opening in the aneurism which it was proposed to make than if we had approached the artery by the lower part of the linear semilunaris, where the incision would have been, therefore, more liable to infection if suppuration should occur in the sac.

The propriety of opening the sac was shown by the free hemorrhage which occurred from the openings of the superficial and profunda femorals, both of which were involved in the aneurismal expansion of the common femoral. This bleeding was only controlled by ligation of both vessels. If not thus secured they would certainly have continued to discharge blood into the aneurism in sufficient quantities to cause its continued expansion. This part of the operation would have been much facilitated had we thought of throwing an elastic tourniquet around the thigh below. All bleeding could have thus been controlled, the arteries isolated, and the sac entirely dissected out. That complete instead of partial removal was desirable is indicated by the suppuration and sloughing of the part left behind, which most certainly started from the remnant in place. The wound in the vein was not followed by any bad results. I would formulate as the proper steps in operation for aneurisms of the groin situated so high up that the common femoral cannot be secured the following:

1. Ligation of the external iliac by the transperitoneal route, through a median incision, with immediate closure of the wound in the abdominal wall.

2. The application of an elastic tourniquet about the middle of the thigh.

3. Free opening of the sac from top to bottom, and the removal of all clots, and the subsequent ligation of all the large arteries found opening from it, and then careful complete extirpation by dissection and curetting. This course will, I believe, be found much easier than attempting to dis-

sect out the mass entire before opening the aneurism. After the opening the afferent vessels can be located outside of the sac by passing a probe along their course through their open mouths. Such vessels are often difficult to isolate. The vein should be spared if possible; but if not, cut between two ligatures. Important nerves will be more easily avoided.

Bolton, in his article on "Special Aneurisms" in Dennis's *Surgery*, vol. ii. page 414, says that "extirpation of the sac has twice been undertaken in aneurisms of the groin—once by Rose in "an aneurism which had recurred two years after ligation of the external iliac," and once by Bazy, "who extirpated a large aneurism with success after tying numerous large afferent arteries." The same author, quoting from Delbet's statistics, gives sixty-seven cases of ligation of the external iliac artery for aneurism of the groin with forty-two cures and twenty-five failures. There were thirteen deaths (two due to accidental causes); in these twenty-five and in the remaining twelve there was no change in five and in five suppuration ensued and a cure resulted. In one gangrene required amputation, and in one secondary hemorrhage required a second ligation and ended in cure.

In estimating the advantage of extirpation of the sac reference may be had to these figures. Thus in sixty-seven cases of single ligature of the internal iliac, the aneurisms remained unchanged in five; in one secondary hemorrhage occurred in the sac, and in five suppuration occurred. Suppuration in the sac is one of the recognized dangers if the sac is not removed, and with its removal suppuration is much less likely to occur in the wound. In five cases no changes occurred in the aneurism after simple ligature; such failure, of course, would not take place after extirpation. Extirpation of the sac may compromise the veins, though not necessarily so; there is sufficient experience now to show that this is not of much importance. Furthermore, recurrence may take place even years after simple ligature, and extirpation of course provides for this.

Kubler (*Beitrage zur klin. Chirurgie Tubingen*, May 28,

1892) has collected forty cases of complete extirpation of aneurism from different sources; twenty-eight of these were arterial, and twelve arterio-venous; twenty-nine traumatic and eleven non-traumatic; and in eighteen the lower limb was affected and in sixteen one of the upper. These cases were all successful except one. In none of these cases was there any mention made of gangrene or secondary hemorrhage.

If the common femoral can be reached in aneurism of the groin a ligature should be placed upon it, and then the extirpation proceeded with as above. In cases of aneurism of the superficial femoral, digital compression gives such favorable results with so little danger that it should first be tried, and if not successful ligature and extirpation proceeded with. In popliteal aneurism, unless of large size, it would probably be more prudent to trust to ligation of the superficial femoral, owing to the relation of the sac to the nerve and vein and to the proximity of the knee-joint.

DISCUSSION.

Dr. James McFadden Gaston, of Atlanta, Ga.—I have been very much interested in the paper of Dr. Dandridge, and more especially in view of the fact that he resorted to excision of the sac of the aneurism afterward. I was unable to understand from his narration, however, what the indications were which caused him to think this necessary, but the subsequent observation of the case probably confirmed his good judgment and the propriety of this procedure. But *à priori* reasoning with me would have been antagonistic to this procedure. It so happens that I have had a very interesting case of aneurism involving both the popliteal and femoral arteries in which I resorted to a double operation, operating in the first instance for the relief of the popliteal aneurism by cutting down into Scarpa's triangle and ligating the femoral, getting a satisfactory result, and obliterating the popliteal aneurism. After it had entirely disappeared and there was evidence of return of circulation to the anastomotic vessels, I directed attention to the upper aneurism. I tried manual compression over the pubic bone, the aneurism was

in the common femoral very near the point of departure of the profunda, but pressure over the femoral adopted prior to the first operation and subsequent to it availed nothing, except as I found afterward that the tissues were agglutinated together by adhesive inflammation from the effect of pressure. Finally I succeeded in obliterating the popliteal aneurism, and for the femoral aneurism I thought of cutting down as near the pubic bone as possible for the purpose of ligating it at that point, but as there was agglutination of the fascia and sheath of the artery I abandoned the idea of ligating at that point, and tied above, making an extra-peritoneal incision below the anterior-superior spinous process of the ileum and ligated the external iliac at that point. Subsequent to this operation it was necessary to give very great attention to the vitality of the limb. The limb became cold, lost its natural temperature, and it was necessary to keep up artificial heat for some time, and it was enveloped with a bandage to keep up support from the body. In the course of two weeks after the operation there was some indication of sloughing. The slough of the foot was very slight, exfoliation occurred, and restoration was established of the circulation throughout the limb. This case has been reported in Dr. Souchon's record of this class of operation. It was a very important matter in this case that I divided the operation, took the lesser first, and got the anastomosing circulation established through the lower part of the leg. I think the man subsequently died from an aneurismal tumor which had developed in the aorta. There were indications from the sounds that an aneurism was developing in that part. He survived the operation six or eight months. I did not have the opportunity of seeing him at the time of death or of making a post-mortem examination. I do not know what occurred in the aorta, but it was evident that there was a tendency to dilatation of the aorta, and there probably developed an aneurismal tumor.

I would like Dr. Dandridge in his rejoinder to tell us what were the indications in his case which led him to the excision of the aneurismal sac. It strikes me it is not ordinarily demanded, and I think it induces complications in these cases of aneurism. I have repeatedly operated for aneurism of the popliteal artery, but have never found any difficulty in the tumor gradually dis-

appearing. Sometimes it may take weeks or months for the tumor to disappear, but it generally does so by a process of gradual absorption.

My efforts in attempting to accomplish anything in the treatment of aneurisms by pressure have been a failure. I have attempted on a number of occasions to do so, but was never able to secure a satisfactory result in any particular case where I attempted to make pressure to control the aneurism. Ligation of the distal side of the vessels is not a satisfactory procedure as a general rule.

Dr. William E. Parker, of New Orleans, La.—I wish to congratulate Dr. Dandridge on the result attained in his case of aneurism. I have seen four cases in which the external iliac was ligated for aneurism of the common femoral, but all of them were done extra-peritoneally. From the Doctor's description of his case, it was certainly a more difficult operation than in those cases I speak of. The first case I saw was one in which I assisted Dr. Logan, of our city, to operate some seven or eight years ago. It was quite a large aneurism and extended well up the leg. But we were able to do an extra-peritoneal operation. In that case the sac was not opened.

The second case I speak of was one which occurred in the practice of Dr. Miles during the last year of his life. This was also a large aneurism, and in that case he tied the external iliac and the femoral at the apex of Scarpa's triangle. The patient made a good recovery, and his leg is as useful to-day as it ever was. But he had a large mass just over the site of the aneurism. During the past winter this man came under my care with an abscess of the shoulder-joint. In speaking of the case with one of my colleagues he strongly urged me to cut down and turn out the clots and try to get rid of the mass. As it was not troubling the man I though we had better not trouble him.

The other two cases are more recent, and in one of them we simply ligated the external iliac. In the second the external iliac was ligated, as well as the femoral, and an incision made into the sac, the clots turned out, and the sac removed. All of the cases recovered without any bad symptoms, and all of them are well to-day, so far as I know.

In all cases of aneurism, where we can do it, I think it is a

good plan to treat the case first by incising the sac, turning the clots out, and then removing the sac.

Dr. John D. S. Davis, of Birmingham, Ala.—I fail to understand why Dr. Dandridge opened the aneurismal sac in his case and afterward removed it. We all know that the usual result of those cases, where we tie the artery on the afferent side, is that they get well, even if it be a traumatic aneurism. I have had two cases of traumatic aneurism of the femoral artery. The artery was tied in one case, and the patient got well. My experience has been that in aneurism of the popliteal artery, where we tie on the afferent side, the patients get well. I shall be glad to have the essayist discuss that point in his closing remarks.

There is one important feature I desire to call attention to in the treatment of aneurism, and that is the necessity of establishing collateral circulation. In a case of aneurism of the external iliac, operated on by my brother, pressure upon the artery had destroyed in a measure the calibre of the vessel—sufficient, at least, to establish collateral circulation; and when he tied the common iliac there was no coldness, tingling, or disturbance of the limb. It remained warm from the beginning. If you tie the common iliac, unless the collateral circulation is already established, you have trouble result, as the Doctor had in his case—namely, coldness, tingling, and so on. We did not apply the method in aneurism of the femoral, because the pressure had in a measure obliterated the calibre of the vessel sufficient to establish circulation. You can establish it in twenty-four hours, and in all cases in forty-eight hours, by a relay of assistants or nurses, or by simple pressure with the tourniquet, lightly applied to the vessel on the afferent side of the aneurism, and it is an important feature. I should adopt it in all cases where I operate if I had time.

Dr. Bacon Saunders, of Fort Worth, Texas.—My experience has been limited to one case of traumatic aneurism, a small one, and treated by pressure, and symptomatically cured at last. I have had no operative experience in the treatment of aneurisms of the femoral artery.

Dr. A. M. Cartledge, of Louisville, Ky.—I have had no experience in the treatment of aneurisms in this region. I have

seen one case in the practice of a colleague of mine of aneurism of the common femoral in which the external iliac was ligated on the right side and the sac extirpated. The gentleman was an expert operator, but in doing so the femoral vein was wounded, causing him a good deal of trouble. It seems to me the great danger of attempting to extirpate the sac in cases of femoral aneurism is in wounding the femoral vein, which is more serious than wounding the artery. While I think the tendency of modern surgery is to advise extirpation of aneurimsal sacs as representing tissue of low vitality predisposed to suppurative changes, still I think an exception should be made, if anywhere, in the region of the common femoral. This vessel and its relation are such that I think, as a general thing, extirpation should not be carried out in this situation. I ligated the external iliac artery where there was rupture of the vessel from an abscess in hip-joint disease, the man making a very satisfactory recovery.

Dr. A. V. L. Brokaw, of St. Louis, Mo.—I have had a very limited experience in the treatment of aneurisms. However, I believe the treatment adopted by Dr. Dandridge in his case is in keeping with advanced surgery. I believe that under the circumstances he did what was best for the patient. At times we are fearful that there will be certain accidents. I have seen accidents follow at remote periods from the time of ligation of the aneurismal sac and removing its contents. In these days of cleanliness I believe it is good surgery to extirpate the sac and remove its entire contents promptly. Possibly it might be easier to incise the sac and turn out the clots than to extirpate the sac. Nevertheless, I consider it good surgery to do it in every instance where it is possible. I congratulate the Doctor on his result. There was a time when such surgical interference with the sac would be considered highly improper. But that time has passed, and we can do to-day what we could not do in those times simply from the fact that we are clean.

Dr. Desaussure Ford, of Augusta, Ga.—I have had no experience in dealing with the aneurisms of this region mentioned by the essayist. However, I think it would be interesting to state that I performed an operation for an aneurism of the upper popliteal, ligating the common femoral in Scarpa's triangle, and

I had no difficulty with the man afterward. I did not extirpate the sac, but I agree with the essayist that it is often a proper procedure in this day of aseptic surgery. An interesting feature in connection with my case was, that three days after the operation the man was taken with confluent smallpox, was conveyed to a smallpox hospital, and I was able to follow the result of the operation. He recovered both from the surgical procedure and from the smallpox. The result was a good one. The case was reported in a medical journal some years ago.

Dr. Dandridge (closing the discussion).—In regard to the reasons why I opened the sac, I did it partly on general principles. I have been very much impressed with the arguments advanced in favor of the removal of the sac in a certain percentage of cases. When removal is not practised we have suppuration; in others, failure in the immediate result of the operation; and in still other instances we have recurrence. I think it must be considered an ideal operation to remove this mass, which experience has shown gives rise to serious trouble, and I believe that the tendency of surgery is to make it the operation of election. Of course, we will have to determine by further experience, in the case of an aneurism situated in the politeal artery with its important relations, whether it were wise to attempt it or not. But it should be considered an ideal operation to perform.

In aneurisms of the femoral artery great success is attained by digital superficial compression, and I think we should always employ it in this position. We can make the digital pressure high up and the operation considerably lower down, so that the tissues through which the operation is made, should it become necessary, will not be altered by inflammation. I have had one successful case of popliteal aneurism cured in this way, and one case in which I applied the ligature on account of failure of digital compression. In popliteal and femoral aneurisms I should invariably try digital pressure first. The subsequent procedure would have to be determined later.

Dr. Davis.—In applying pressure for the treatment of popliteal aneurism do you apply it to the aneurismal sac?

Dr. Dandridge.—No. I have only partly answered Dr. Gaston's question. It was a dangerous matter to leave here an

enormous collection of blood. You must remember the aneurism extended up to Poupart's ligament, and as it increased it extended on the outer and upper side, so that it was well above the crest of the ileum, and that the patient had a large amount of blood which invaded the iliac fossa. Indeed, pulsation could be felt in this direction after my fingers were inside of the abdomen. I thought it was a dangerous matter to leave so much blood in the tissues. The aneurism extended down so far that the exact relation to the superficial and profunda femorals was not made out. The aneurism involved the opening into these vessels.

This is a point we should have in mind. I must confess I did not think of it at the time of operation. Ever since the operation I have wondered that I did not at once think of the propriety of putting on an Esmarch bandage below, then taking my time in dissecting up the aneurismal sac. Extirpation of the sac has been effected without opening the sac. This, I think, is more difficult than to open the sac and remove the contents. If you open the sac, you have the opening of the vessel in view and you can pass a probe down the course of the vessel, which it at once locates, and you can readily secure it. It is not easy to recognize the vein or artery in which there is no pulsation or no blood. I believe I have covered the ground of the questions which were asked.

In regard to traumatic aneurism, a wise course is to treat it as a ruptured artery; put the ligature above and below it, and I should be very chary about trying to secure a traumatic aneurism, within a short time of the trauma, by only putting on a ligature above. I should lay it open and ligate above and below. This I did in an aneurism of the posterior tibial a year ago. The leg assumed enormous proportions, swelling developed in the course of three or four weeks, so I was uncertain at first whether I had a sarcoma, an abscess, or a ruptured aneurism. I applied the Esmarch, laid open the sac, and an enormous amount of blood gushed out. I ligated the ruptured aneurism, which was as big as a nut.

THE EVOLUTION AND PERFECTION OF THE ASEPTIC SURGICAL TECHNIQUE.

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It is not my purpose to trace every step in the origin and development of aseptic and antiseptic surgery or to discuss the comparative merits of various germicidal agencies. The relation of micro-organisms to wound-infection and the efficacy of aseptic and antiseptic methods have now passed beyond controversial limits and have reached the finality of absolute demonstration. Notwithstanding that a revolution has been wrought in surgery in consequence, much yet is required to perfect the modern system of wound-treatment. It seems that the present is a most opportune time for surgeons to review bacteriologic data and working-methods based thereon, so as to eliminate all that is useless and superfluous, and concentrate attention upon that which is absolutely essential. While the conditions underlying wound-infection are generally understood and accepted, the technique observed by operative surgeons generally is not so thorough as to secure that precision and uniformity in practical results which theoretically should be obtained and which undoubtedly are practicable. To this latter point I shall revert presently.

The first definite and refined experimental data initiating modern ideas of wound-treatment came from Pasteur, who demonstrated the relation of bacteria to fermentation and putrefaction, and thus suggested that the phenomena which occurred in wounds were due rather to the entrance of

something from without than to some cause within. Pasteur showed that putrefaction was a fermentative process caused by the growth of microbes, and that these organisms could not arise *de novo* in the decomposable substance; that these germs abounded in the air. Lister inaugurated a system of wound-treatment founded upon these observations. The primal idea in Lister's mind originated in the common observation of the difference in the clinical course of simple and compound fractures.[1]

It was most logical that he should have regarded the air as the bearer of infective germs, begetting in open wounds the fermentative process of suppuration so analogous in all essential features to the putrefaction of animal fluids and solids. His conception was to treat the wound with some substance which, without doing serious mischief to the tissues, would destroy the microbes already contained in it and prevent the future access of others in the living state. For this purpose he selected carbolic acid, with which, in solution, he treated the wound, hands, instruments, and everything which might come in contact with the wound. Regarding the air as the chief source of infecting bacteria, he hoped, by a spray of carbolic acid, to disinfect the air over and about the field of operation. The dressings applied to the wound were permeated with carbolic acid, and all possible precautions were observed in their arrangement to exclude the air. Extensive use of drainage-tubes and frequent change of dressings were prominent features of the method. The very essence of all the great advances in surgery and medicine based on bacteriologic investigations, and which have revolutionized the practice both of medicine and surgery, is contained in this apparently simple induction by Lister. It detracts in no way whatever from the value of his discoveries that advancing knowledge has improved and simplified the methods originally instituted by the founder of antiseptic surgery. The great pivotal fact stands just as Lister worked it out—that

[1] Presidential Address before the British Association for the Advancement of Science, Liverpool, September 16, 1896.

infection of wounds is effected from without, and is due to micro-organisms acting in an analogous manner to similar forms of life in begetting fermentation and putrefaction as demonstrated by Pasteur. The mental picture he formed of the difference in healing of a simple and compound fracture is as illustrative to-day as in 1867.

As already observed, Lister's early work, though abounding with experimental studies relating to changes produced by bacteria when admitted into blood and milk, was based upon analogies drawn from the relation of bacteria to the processes of fermentation and putrefaction. Almost nothing was known as to the specific character of the bacteria producing suppuration and other processes of wound-infection. In 1878 Robert Koch made an epoch in the development of bacteriology which has revolutionized medicine and established a definite scientific basis for the perfection of Lister's ideas. By his brilliant researches Koch demonstrated that various infectious diseases were caused by specific micro-organisms. Three years later Koch gave to the world the details of his method of isolating and cultivating bacteria in solid transparent media, which made possible the great discoveries of modern bacteriology. Indeed, at this period it may fairly be claimed that the science of bacteriology was born. The studies of Ogston, Rosenbach, and Passet upon the bacteria of suppuration followed, and the pyogenic staphylococci and streptococci were demonstrated. The character and habits of these great enemies of the surgeon, their method of access to wounds and distribution inside, were studied by observation and experiment. Two important deductions were soon made known: First, that atmospheric microbes are mainly of an innocent character as related to wound-infection; that the *habitat* of micro-organisms is upon ordinary objects, and not in the air, and that infection comes from *contact;* second, that the fluids and cells of the animal body are capable of disposing of a considerable number of pyogenic bacteria without appreciable injury. The practical application consisted in dispensing with the spray; in concentrating atten-

tion toward excluding germs from wounds, and in discontinuing the application of strong germicidal agents which destroy the physiological resistance of the tissues to germ invasion. These later observations will be recognized as the fundamental principles by which asepsis was brought forth. The perfection of methods of drainage, for the double purpose of removing the pabulum most acceptable to germ development and to prevent tension, belongs to the Listerian system, as does also the use of the animal ligature, which may be readily disposed of by the tissues instead of remaining as an irritant. These fundamental bacteriologic principles compose the basis of modern surgery.

Within a few years standard and classic treatises on surgery were rendered obsolete; new text-books had to be written. The science and art of surgery attained a perfection in practical results surpassing the highest ideals of the surgeons of a preceding generation. New departments of surgery were established and regions invaded which were hitherto outside the scope of operative treatment. The science and practice of midwifery was also revolutionized and all its teachings recast. The results are the pride of our profession and the wonder of the latter half of the nineteenth century. The influence of the discovery and classification of the pathogenic bacteria upon surgery can scarcely be appreciated by surgeons themselves without reflection. Indeed, until this time surgery could scarcely be called a science; it was practised for the most part as an art.

The great facility of absorption possessed by the peritoneum made abdominal surgery the field of conflict for deciding the comparative merits of asepsis and antisepsis and the relation of bacteria to wound-infection generally. By many the protection assured by sterilization and mechanical cleansing without chemical germicides was interpreted as disproving the bacteriologic basis of modern wound-treatment. The injurious local effects of chemical germicides soon became generally recognized in abdominal surgery, and these agents were eliminated from the technique of this department of

surgery. The influence of abdominal surgeons in promoting aseptic methods to the superseding of antiseptic agents is well known. Moreover, increased experience showed that chemical germicidal agents do not possess the vigor of germ destruction first attributed to them. Much of this confusion was due to the failure to recognize the power of the tissues to resist germ invasion, and that in almost all surgical operations a certain degree of bacterial infection is overcome by this resistance.

The agitation excited by the advocates of asepsis and antisepsis was most unfortunate. Reliance upon antiseptics begot a disregard for mechanical cleanliness and established a confidence in chemical germicides to atone for slovenly methods throughout an operation. Moreover, the profession was slow to recognize that the germicidal power of a chemical agent, as shown by experiment within a small area, is not proportionate when applied to large operative fields. Again, it was some time before it was conceded that such chemicals impair the tissues of wound-surfaces and weaken their resistance to microbe invasion.

At this stage of the evolution of modern surgical methods professional opinion was in a state of great confusion and uncertainty. Many leaders in surgery, while practising asepsis (and this is especially true of the Birmingham school of surgery) derided all bacteriologic discoveries and repudiated germ invasion as the cause of septic infection. This school of surgeons used the term "dirt" and lauded "cleanliness," repudiating the terms "bacteria" and "sterilization." The result was that many practitioners of surgery were misled; confidence in fundamental principles was impaired or destroyed, and only half-hearted efforts of antisepsis and asepsis were put forth. The disastrous results of those times, four or five years ago, are fresh in the memory of all present. These discussions have now ceased, and throughout all civilized nations where surgery is taught and practised as a science the principles here enunciated are accepted and applied.

With the knowledge we now possess as to the relation of micro-organisms to wound-infection it might be reasonable to presume from a theoretical standpoint that suppuration and systemic infection should be banished from surgical experience. Indeed, with the precise knowledge derived from bacteriologic investigation as to the pyogenic bacteria and the demonstrated resources for their destruction and elimination in surgical practice, it would seem that such perfection of technique is practicable as to remove sepsis altogether from the possibilities of elective surgical procedures. This degree of perfection, however, has not yet been attained; and it is doubtful if it ever will be.

It has been frequently stated that when suppuration supervenes in a wound, deliberately made by the surgeon, through healthy integuments, there has been some avoidable error in the operative technique. While such a standard is justified by bacteriologic demonstration, and should be held up by every conscientious surgeon as a criterion and guide, it can scarcely be attained in practice. The truth of this observation is attested by a cursory glance over the current medical literature of the day. Clinical reports and society discussions abound with deaths attributed to "heart failure," "suppression of urine," "intestinal obstruction," "exhaustion," and other vague causes of death which are, as a rule, due to sepsis. That suppuration in operative wounds is very common is generally known. Such unfortunate results are almost the rule in operations of emergency and in operations hastily carried out in private practice. Under these circumstances, however, no fair test is made of a thorough aseptic technique, and infection is due to the imperfect use of those resources known and applied by operative surgeons. But under conditions where all facilities are at hand, and where reasonable care is observed, suppuration and infection continue to occur in a considerable proportion of cases. In proof of this latter statement I would cite the words of a master in surgical pathology and operative methods: "I have made it a duty on my part to familiarize myself with the advances

made in the technique of aseptic surgery, and have the good fortune to perform all my operations in two of the best hospitals in Chicago and in a fairly well-equipped college clinic, and yet I am only too willing to confess that I never finish my day's work without seeing pus. I have a painful recollection of two amputations for carcinoma of the breast on private patients, in both of which every possible precaution was carried out, and yet, to my utmost disappointment, both of them died of the most virulent form of sepsis I ever encountered. To offset these cases I might refer to perhaps over two hundred similar operations in which, under much less rigid precautions, with few exceptions, faultless wound healing was obtained. I remember, too, a case of genu valgum in an adult, treated by transcondyloid osteotomy under strict antiseptic precautions, where the operation was followed by violent suppurative osteomyelitis and extensive necrosis, which for a long time seriously threatened the limb and life of the patient. I am sure that I am not alone in relating such experiences."[1]

Again, as proof that the most complete scientific equipment and environment for operative work, together with experienced and skilled operators and assistants, do not establish an absolute guarantee against sepsis, the following report of Dr. J. G. Clark, of the Gynecological Department of the Johns Hopkins Hospital, is cited: "I recall a hysteromyomectomy in a colored woman which was free from streptococci, as shown by cultures taken from the interior of the uterus at the time of the operation. The evening of the day of operation the patient developed a temperature of 105° F., and within the next forty-eight hours died. Cultures from the blood and all of the organs showed myriads of streptococci. The infection was so virulent that the patient had been simply overwhelmed and died of acute toxic symptoms. The peritoneum showed little evidence of serous inflamma-

[1] "On Some of the Limits of the Art of Surgery," by Nicholas Senn, Journal of American Medical Association, May 9, 1896, p. 906.

tion, as death had occurred before a marked reaction could be established."[1]

During the past year, after an unbroken series of sixty-four abdominal sections without a death, I lost a patient after an operation for hysterectomy under identical circumstances to those above related by Dr. Clark. The case was altogether uncomplicated, and the operation presented no unusual difficulties. It was performed in the same operating-room, with the same assistants, nurses, and with all the care and protection of the previous operations. A very careful investigation convinced me that the infection could have been conveyed by no other means than by the operator's hands.

It is the purpose of this paper, in view of these facts, to invite attention to the several parts of the modern aseptic surgical technique, in order to determine the weak places and direct attention to reinforcing the same. In the first part of this paper I have briefly presented the steps by which our present defense against bacterial invasion and its results was established; that the methods of protection based upon these scientific principles of bacteriology have almost eliminated sepsis from the dangers of operations and revolutionized surgical practice is a demonstration of the accuracy and reliability of those principles. That in proportion to the increased precision born of experience with which surgeons work, sepsis is lessened is an additional proof of the possibilities of obtaining complete immunity from sepsis. Whether or not such perfection will ever be attained is doubtful; but a nearer approach to complete immunity from sepsis must be the aim of surgeons at all times.

In taking up the various parts of the surgical technique with a view to detecting its vulnerable points, we must first direct our attention to certain personal characteristics of the surgeon himself. In the first place, it is indispensable that one doing surgery should have some general knowledge of the character and life-history of the micro-organisms with

[1] American Journal of Obstetrics, May, 1896, p. 718.

which the surgeon has especially to deal. It will not suffice to have only a vague idea that germs exist which, if conveyed into a wound, will infect it; he must know something of the *habitat* and mode of diffusion of these invisible forms of life. Fortunately, bacteriologists have so simplified this subject that one can very easily provide himself with all essential knowledge relating to the pyogenic bacteria. He should especially attain such familiarity with the character of these micro-organisms as to realize that their spores offer much greater resistance to germicidal agents than the mother-plant. Moreover, the surgeon must have some high conception of cleanliness in order to establish proper defence against wound-infection on the part of himself and also of those associated with him. As long as the meaning of personal cleanliness must vary with the individual interpretation of the surgeon, so will anything like absolute uniformity of results in surgical practice be impossible. And when we come to take into consideration that these same varying features of individuality must obtain in assistants and nurses, we realize how complex and difficult is the apparently simple problem of surgical cleanliness. Indeed, for attaining to anything near to perfection in aseptic operative work, the combined efforts of the surgeon, assistants, and nurses, endowed naturally with special capacities for individual cleanliness and mastery of details, of which the surgeon himself is the chief, are the essential requisites.

With the improved facilities now at the command of operative surgeons in modern hospitals, protection from infection, in so far as relates to instruments, sponges and their substitutes, dressings, sutures and ligatures, together with operative utensils, such as basins, tables, and other apparatus, may be guaranteed. With the usual methods of mechanical cleansing, followed by sterilization with boiling water or steam, it is a simple and easy process, if intelligently and faithfully applied, to render these materials free from the possibilities of infection. That it requires care, vigilance, intelligence, and faithful devotion to the work to establish and maintain

such perfection of detail every one who has followed the work knows full well; but that in this part of the operative technique absolute immunity from sepsis can be guaranteed there can be no doubt. That part of the operative technique, however, presenting the greatest difficulties relates to the disinfection of the surgeon's hands and assistants' hands and the surface about the field of operation.

To show that this has long been recognized I quote the classic language of the late Thomas Keith: "It is, unfortunately, a melancholy story that ever since surgery began the most of the mischief was done by the surgeon himself. It was the willing and tender, though *unclean* hand, that carried the poison into the wounds."[1]

Here is undoubtedly the vulnerable point in our armor. When we remember that the surgeon's hands, from the nature of things, must come daily in contact with pyogenic bacteria in the performance of his varied duties—making examinations and dressing wounds—we must recognize that here lies the greatest peril of wound-infection. Moreover, since infection obtains by contact, the surgeon's hands are the most constant medium of germ transmission. It is daily demonstrated that boiling is absolutely destructive to all forms of bacterial life which could possibly infect a wound, but no method yet devised can with such assurance and certainty disinfect the surgeon's hands and the field of operation. It is to the perfection of this part of the operative technique that more care should be given and improved methods should be devised.

It is well known that various micro-organisms are so intimate in their relation to the skin that it is almost impossible to get rid of them. Investigations by competent observers have shown that no matter how rigid the disinfection of the patient's skin, and the cleansing of the operator's hands, the sterilization of instruments, and other precautions exercised, a certain number of wounds in which sutures are employed will suppurate. While these cases are very rare, bacterio-

[1] "On Hysterectomy for Fibroid Tumors," by Thomas Keith, Edinburgh.

logic investigation demonstrates their possibility as a result of bacteria imbedded in the skin. Welch has described, under the name of staphylococcus epidermidis albus, a micrococcus which seems to be habitually present upon the skin, both upon the surface and deep down in the Malpighian layer. He is of the opinion that this micro-organism may, under certain conditions, be a cause of skin abscesses, regarding it as the same organism commonly present upon the skin and known as the staphylococcus pyogenes albus in an attenuated condition. These organisms are found to be capable of development when removed from the epidermis after the hands have been immersed in strong solution of bichloride of mercury and other germicidal solutions. Whether or not this form of micrococci is ever the active means of infection after thorough scrubbing and disinfection of the hands is somewhat doubtful; but this observation has shown that the ordinary cleansing and disinfection of the skin with the means now in use are far from perfect. These facts give additional and indubitable evidence of the necessity of devising more perfect methods of skin disinfection.

The limits of this paper prevent that thorough consideration of this important part of the aseptic surgical technique which its great importance demands, and it is only my purpose to emphasize a few common-place but essential requisites for hand cleansing which all concede to be necessary, but are so constantly and generally neglected. The subject of hand disinfection in detail is now receiving, and must continue to receive, careful consideration.[1]

I would call attention to the necessity of a surgeon habitually engaged in operative work giving daily and constant attention to his hands, with a view to habitual cleanliness and freedom from abrasions and consequent foci of infection. I am aware that this is frequently mentioned in treatises on the aseptic surgical technique, and am equally aware that it is not commonly observed. The surgeon's hands should not be soft and tender;

[1] "On the Disinfection of the Hands," by Robert F. Weir, M.D.. New York Medical Record, April 3, 1897, p. 469.

they should be accustomed to work, and consequently the skin should be firm, and thereby equal to resisting slight injuries. The nails should be kept carefully trimmed and the spaces thereabout thoroughly cleansed. After making vaginal and other examinations wherein the hands are brought in contact with discharges, more than a mere hasty washing should be done. They should be thoroughly cleansed with warm water, soap, and brush. If such facilities are not at hand at the moment, they should be obtained as quickly as possible after each examination. Gloves very quickly become infected, and may remain indefinitely the means of renewed infection. In preparing for an operation at least thirty minutes should be reserved for cleansing the hands. The same precautions as to time and detail should be observed in the preparation of the surfaces forming the field of operation. The surface of the body is constantly swarming with micro-organisms, the habits of the individual having much to do with their character. Pus-forming agents are completely protected by the fatty products of the sweat ducts, and the removal of these products along with dead epithelium is essential to anything like a thorough mechanical cleansing of the skin. The use of soap and water, thoroughly applied with brush, followed by a vigorous application of alcohol, ether, or turpentine to remove the fatty products mentioned should be a preparatory step to the application of chemical disinfection.

After numerous tests with various methods of disinfection for the hands I have adopted the following, which is commended by its simplicity as well as its efficiency:

The hands are first examined as to any abrasions or injuries, and the nails, if too long, carefully pared and the spaces about cleansed with a nail-cleaner.

The arms having been bared above the elbow, the hands and arms are scrubbed with a liberal quantity of green soap with hot water and a stiff brush for ten minutes.

After drying the hands and arms with a towel, the nails and underlying spaces are again carefully cleansed with the

nail-cleaner. Ordinary mustard-flour mixed with warm, sterilized water in the hands is applied with friction for five minutes, and then washed off with warm, sterilized water.

The hands are now thoroughly bathed in strong alcohol (80 per cent.).

After putting on an apron or gown, the hands are given a final washing in warm, sterilized water.

The same principles are applied to the cleansing and disinfection of the field of operation as are observed in preparing the surgeon's hands.

General baths for several days should be given in all cases whenever possible, and a general bath should closely precede the special preparation of the operative field.

Thorough scrubbing of the operative field and adjacent folds of skin with warm water, soap, and brush, using the razor upon hairy surfaces, should be applied several hours prior to the operation.

Ether, alcohol, or turpentine should be used to remove all fatty products from the skin, and finally a protecting pad of sterilized gauze should be secured by a bandage to protect the disinfected area. A final cleansing with soap, hot water, brush and alcohol should be applied on the operating-table after the patient is anæsthetized.

During the operation the tissues exposed should be handled as little as possible. By packing off areas of exposure with sterilized gauze and avoiding the handling of all parts which are not to be removed, the danger of infection from the hands is much reduced.

DISCUSSION.

Dr. Howard A. Kelly, of Baltimore, Md.—It gives me great pleasure to speak briefly on a subject so interesting and important as that dealt with by Dr. McMurtry. I agree with him in regard to the necessity of taking up this matter from time to time. The subject is important for two reasons, both of which have been brought forward by Dr. McMurtry. One is, that when I travel over the country at large and notice the practice of different surgeons I find there is an enormous diversity. Another point is the extreme infrequency with which surgeons report their cases as dying from sepsis. The microscopic appearances of sepsis in the peritoneum are not always decisive. Cases of fulminating peritonitis, of dry peritonitis, such as were cited by Dr. McMurtry, where the patients die within twenty-four hours, die without any macroscopic appearances of sepsis in the peritoneum. There is no time for pus to develop, and the patients simply die of a more virulent form of sepsis than usual. It is important that surgeons in this matter should put the blame on their own shoulders, and they will then be more careful in correcting errors in their technique, and so will save more lives in the end. We have, further, two things to consider, antisepsis and asepsis. Antisepsis, or the active elimination of sepsis, has its place before the operation, and asepsis has its place throughout the operation. In antiseptic matters we are all pretty well agreed. By means of steam for silk ligatures and dressings, of the soda solution for instruments, and by using kumol for catgut, we can with absolute certainty sterilize our dressings, and every surgeon now uses these agents. In our antiseptic technique we cannot use these agents on our hands, and there is the loophole through which infection often creeps. I have been watching this matter with particular attention for the past several years, and am more and more convinced every year that the hands, fingers, and finger-nails and subungual spaces of the surgeon and his assistants are a means of conveying infection from one patient to another. As Dr. McMurtry has urged great care in cleansing the hands and fingers, I would urge further that the care of the hands begin with the preceding operation and con-

tinue throughout the intervening period up to the next operation. If the surgeon has been handling a septic case, he should be extremely careful in cleansing his hands at once, spending considerable time on them in order to get rid of the septic material before they become dry; he should also prepare himself thoroughly before the next operation. I consider a man who is doing abdominal surgery utterly debarred from examining cases of puerperal sepsis unless he covers his hands with rubber gloves. I had a long list of consecutively successful operations last year, and then I was called in consultation to see a puerperal case, and examined the woman on a Saturday; the following week I had three deaths from sepsis in cases operated upon within three days, two in the Johns Hopkins Hospital, and one in my private hospital. Such instances might be multiplied; they show the importance of great care on the part of the surgeon. I cannot see how a man can do general surgical work, opening abscesses, treating erysipelatous and bone cases, and then perform an abdominal operation, unless as a matter of absolute necessity, as, for instance, if he is the only surgeon available and the operation must be done immediately. It is my rule, whenever any sepsis arises in the hospital wards, to suspend operating for several days until I try to find out the cause. I have everything examined and cleaned, and we go on with our work afresh with better satisfaction. When a surgeon begins his work after the holidays he is likely to have a long list of successes, and then breaks occur in groups of cases; this shows of itself that contamination is conveyed from one case to another.

The question of cleansing the hands is most important. The finger-nails must be short, not more than a millimetre in length, and the mechanical part of the process is exceedingly important. We should use warm water, with a good alkaline soap, kitchen soap—brown olein soap; I would emphasize very earnestly the use of a good, stiff brush, and not one of those miserable soft brushes which are used by some operators and will not go under the nails. I cannot describe the exact kind of stiff brush, but those who have had the experience know what I mean. The vegetable fibres of this brush should be very thoroughly sterilized by steam; the hands are then scrubbed from ten to twenty minutes, never less. The hands of the assistants ought to be

scrubbed for a longer period of time, until they learn how to wash their hands. An operator of experience can clean his hands very well in ten minutes. This mechanical process is exceedingly important, for when we infect a patient we do so mechanically by rubbing off from the finger-nails débris and conveying it to the abdominal cavity in contact with the tissues there. If we rub off everything with the brush, we remove all the loose tissue about our hands by thorough scrubbing. It is important, also, throughout the operation, especially in the removal of abdominal tumors, to limit the handling as far as possible to those structures which are to be removed and to touch as little as possible those organs which are to remain behind. We should cover up the intestines with gauze; we should not pull on the broad ligaments and stump with the hands. We should protect the edges of the incision with gauze.

I think the conclusion of the whole matter is that all over the country there is not enough care exercised in cleansing the hands prior to operating, and that surgeons do not fully realize the fact that it is the hands which are the chief means of conveying infection from one patient to another. The methods of sterilization and cleansing of the hands are not sufficiently uniform throughout the country, and it is to the hands of the surgeon that we must look for our cases of infection.

Dr. Geo. Ben Johnston, of Richmond, Va.—I do not think Dr. McMurtry ought to apologize for taking up this subject in the able manner in which he has presented it any more than an officer in front of his enemy should apologize for the drilling of his troops and the inspection of his munitions of war, because this subject is one in which we, as surgeons, are not only interested, but one in which all of those who are committed to our care are interested. Therefore, I consider it eminently proper that it should be kept constantly before associations of this character. I am convinced, along with Drs. McMurtry and Kelly, that the greatest source of danger to the patient is through the surgeon and his assistants. We can deal with our materials, our dressings, our instruments in a manner entirely different from that which we apply to ourselves, and render them sterile and free from contamination, but it is a difficult matter for either the surgeon or his assistants to so thoroughly cleanse

themselves as not to leave the suspicion of danger. I can better illustrate what my views are on this subject by giving an account of my own practice. In the first place, I keep among my corps of assistants a man whose business it is to dress nothing but unclean cases, such as bone cases, old ulcers, and those cases which come to me contaminated. He never under any circumstances handles any of the dressings for a clean case, nor does he handle any of the instruments, but devotes himself exclusively to the unclean cases. In the next place, the instruments are so assorted as to have a batch which should be devoted entirely to clean cases, and another batch which are devoted to unclean cases. I make it my invariable rule never to examine any cases or to dress any wounds that are suspicious on the day upon which I am to perform any grave operation, and particularly if this operation is an abdominal one. In the matter of assistants I strive, as far as possible, to have always the same corps of men and to have each of these men assigned to do a certain thing, so that there is never any shifting or changing. One man, for instance, has always charge of the instruments, and another assists in the operations. As soon as the abdomen is opened—granting that it is an abdominal operation—those tissues which are not to be removed, or in no wise mutilated, are protected with one or more layers of gauze, so that whatever contact there may be between them and the surgeon's hands takes place through this gauze.

In reference to cleansing the hands, of course, great care is to be taken of them, not only during the time of operation, but at other times. Those who are constantly operating and subjecting their hands to the trying ordeal of green-soap, hot water, nail-brushes, and chemicals are obliged to produce such excoriation of the skin as to induce the condition ordinarily described as chaps. This allows fissures and irregularities in the skin in which poisonous materials may lodge. The surgeon should not only take care of his hands during an operation, but likewise at bedtime. I wash my hands thoroughly with soap before retiring, and use some emollient that will soften the skin, and I prevent these little fissures which may become the receptacles of poisonous material. In the preparation of the hands for operation have an abundance of time to do it, and the first step

is to wash them well with green soap and a nail-brush that will not injure the skin, whose bristles are fine enough to penetrate the little interstices of the skin and deprive the skin of whatever filth there may be upon it. Dry the hands well; cover them with a thick layer of green-soap, rubbed in until the hands are dry, allow it to remain fifteen or twenty minutes; in the meantime go about something else. Then ten minutes before the necessary time for operation I wash off this dry coat of soap, take a new supply of soap and wash for ten minutes longer with the brush until my hands are as clean as they can be made by any of the mechanical processes. In the preparation of the patient it is not only necessary to prepare at the time of the operation, but to do so long before that. The practice which I pursue, if it is a case in which it can be done generally, is to give a warm bath, then scrub the site of operation, which is shaven with a razor in several directions; scrub again, and finally a wet dressing of bichloride is applied and allowed to remain under protective dressings for twenty-four hours, and the field of operation is again scrubbed and thoroughly washed with sterilized water when the case is put on the operating-table. When this is done I believe the patient is made as clean as possible by mechanical processes, and I undertake the operation with some degree of confidence. But notwithstanding all of these precautions we do meet with cases which are a surprise to us, and it is within the last week that I have encountered a case which is a parallel to the two cases mentioned by Dr. McMurtry. This case occurred last Monday morning. I had taken all the necessary precautions; I had a series of successful cases, yet this fatal one occurred, for which I could find no reasonable explanation.

I am extremely glad the doctor has brought this subject up, and I hope it will be freely discussed, because I know of no topic that can come before us more important than it.

Dr. Charles P. Noble, of Philadelphia, Pa.—I agree with the preceding speakers that there is no subject which is more important than the one under discussion, because it is fatal in many cases and concerns every patient upon whom we operate. In abdominal surgery it is more important than in general surgery. We must all agree with the general principles laid down

by Dr. McMurtry. In discussing this question the only way to do it is to give our own experience and the lessons which have been drawn from it. In the first place, we must all agree that heat for the sterilization of everything which can be sterilized by it is the most valuable thing which has been added to the technique of antiseptic surgery. In my own work the instruments are boiled and dressings sterilized by steam. I have a sterilizer large enough to sterilize all basins and trays used at operations. It is a great satisfaction in dealing with an infective case to feel that everything but the hands can be sterilized by steam. I would recommend strongly that the instruments be boiled a sufficient length of time in water, and the dressing sterilized in a steam sterilizer. The steam sterilizer is not used as largely as it should be. Many operators rely upon washing and upon chemical solutions for the sterilization of their basins, trays, and instruments. As to the preparation of the patient, the importance of it cannot be too strongly emphasized. We should be extravagant to the extent of throwing away whatsoever is left over from the operation. I am certain many people have been killed by infected ligatures which were left over from operations on previous patients. Whatever is left over from an operation, then, should be thrown away. A few cents worth of ligatures is wasted to great advantage.

In preparing the patient most of us follow the same general rules. If it is an operation of election, two baths are given two days before the operation and a third one on the day of the operation, and the abdomen is also prepared the day before operation. I have made no use of the soap-poultice, because I think it is unnecessary. My experience in the suppuration of abdominal wounds has been very favorable. The use of soap-poultices adds a little to the terror of the patient if she should be put to bed to sleep over night. I looked up my abdominal cases the other day in which drainage was not used; in other words, in those cases of abdominal section in which I could carry out the technique strictly there were 297, and of this number 7 suppurated. The use of soap-poultices, while a good thing, is not necessary, and they add to the discomfort of the patient. The only thing which I have used in addition to the careful scrubbing with soap and water on the morning of the

operation is to scrub the abdomen with alcohol, after which a bichloride dressing is put on, which usually is applied for two or three hours before the operation is done. After the patient is placed on the operating-table the abdomen is again scrubbed with ether, alcohol, and bichloride solution, and the results are as good as those obtained from the use of soap-poultices.

When we come to the preparation of the hands of the surgeon and his assistants, I believe it is a crucial point in the whole matter. Every operator of experience believes this more strongly the more he operates. I regret that I can duplicate the cases reported by Dr. McMurtry, and I can also duplicate Dr. Kelly's experience as to how difficult it is for the surgeon when dealing with a case of puerperal sepsis to cleanse his hands and disinfect them for the next abdominal section. This year I did a Porro operation upon a woman who had an infected uterus, and the next woman had a simple section. The latter operation was perfectly easy, but the woman died of a virulent septic peritonitis. I am quite certain that the infection was carried from this patient to the next one. My own practice, as has been mentioned by the other speakers, is to pay careful attention to my hands all the time. Whenever my hands get rough I stop operating. If the hands of one of the assistants get rough, he stops assisting until they get well. I do not permit myself or assistants to operate unless the hands are in good condition. It is absolutely impossible for any man with chapped hands and sore fingers to thoroughly disinfect them, and therefore he should not operate. I feel myself that it is not possible to get the hands clean in less than half an hour. I devote that time to my hands, and my assistants do the same, and in spite of it once in a while we have a case of infection. Until we have something better than we have now we will occasionally get infection. After spending at least twenty minutes in scrubbing with soap and water, I scrub with alcohol, which is highly recommended for hand disinfection, and my hands go through permanganate of potassium, oxalic acid and bichloride, and my assistants' hands go through the same preparation. I feel that even this is not a perfect method, and that we must be more strict, if it is possible to do so.

Another point which operators can make use of is never to see anybody on the morning of the operation.

I only see patients twice a week, because I operate four days in the week. I do not see patients on the days I operate. I believe the reason some patients become infected is because surgeons or gynecologists make vaginal examinations and then operate on other cases.

Finally, I think occasionally a patient who is supposed to die from septic peritonitis, in spite of what Dr. Kelly has said, has not had any peritonitis at all. I am sure some I have had died from auto-intoxication. On the death-certificates they were recorded as cases of septic peritonitis, although the autopsies did not show any peritonitis, and cultures showed the peritoneal cavity to be absolutely sterile, and no lesions accompanied the infection. The pathologist reports that the deaths were from auto-intoxication and the absorption of toxins from the intestines. In my entire experience I have had three or four cases with a history of long-continued and obstinate constipation. One of the patients I feared might die from absorption of toxins from the bowels, and had the bowels irrigated every two weeks, yet she died from auto-intoxication, and a most careful examination post mortem failed to reveal anything whatever wrong in the peritoneal cavity.

Dr. George A. Baxter, of Chattanooga, Tenn.—It is with a good deal of hesitancy that I, an humble member of the general profession of surgery, should seek to combat those statements that were made here this morning, and I would not attempt to do so did I not believe that I was backed in that opinion by the almost universal sentiment of those who practise general surgery and many who practise gynecology, and from the additional fact that I believe the statements made were made in the heat of enthusiasm, not intentional, perhaps, but a little over the line. The broad statement has been made that the general surgeon should not enter the abdomen except upon extreme occasions, the reasons assigned being the impossibility of his attaining perfect asepsis, and the fact that he may have come in contact with an abscess of recent date. I can see no reason why the general surgeon's hands may not be as absolutely purified by the methods in use—and by this I mean the destruction of all germ-life upon them—as the specialist. He has the same means to accomplish it; he has soap and water in abundance;

he has brushes in plenty; he can trim his nails within a millimetre, as they do, and he can in addition do, as Dr. Johnston does, if he desires to do so, soap his hands over night for the purpose. The general surgeon has access to the same germicides that the specialist has, and knows how to apply them. The only presumption under this statement is, then, that he comes more in contact with septic germs than the specialist. Is this a fact? Are not abscesses just as frequent in gynecological work as they are in general surgery? Is it not a fact that the abscesses met with in gynecological practice are even more virulent in their infection than are those encountered in general surgery? Is it not a fact that every gynecologist of practice, whether operating or not, has his finger in the vagina a dozen times every day; in the home, as I heard said this morning, of those bacilli that produce septic trouble? Is it not a fact that, even if he commences his preparation over night, in the meantime he will necessarily have to touch something else? He makes repeated examinations in order to determine exactly what is to be done, and his hand has come in contact with those discharges which are just as virulent perhaps; and, even in the absence of discharges, his fingers come in contact with the bacilli in the vagina itself. Now, gentlemen, I do not believe that the general surgeon should be robbed of his chance to do good to his fellow-beings. I believe, with the same care exercised in cleanliness, any man's hands can be as thoroughly cleansed in an hour's time as they can be cleaned over night and cleaned the next day. The real time for cleanliness is at the time of the operation. The same germs are in the atmosphere as well, and although the surgeon may have cleaned his hands over night, he may contaminate a patient the next day, and the work has to be done over again before he is fully prepared for operation. The gynecologist has even less to resist than the general surgeon. The general surgeon should be careful in this respect, and I believe is more careful than the gynecologist. It is a well-known fact that the peritoneum resists the action of germs much better than do some of the other tissues. The resistance of the general peritoneum to the invasion of germs makes the work of the gynecologist safer. The gynecologist is extremely careful in the matter of cleanliness and attributes his successes largely to this fact, when in reality,

perhaps, it is the tissues with which he is dealing that have aided him in his excellent results.

Now, I have watched the development and growth of this specialty very carefully, and I have wondered what would become of the general surgeon in the end. They have invaded the pelvis; we have surrendered it practically to them. They have now invaded the abdomen, and last night, in a discussion, I believe it was claimed, in this hall, that operations for gall-stones properly belonged to the gynecologist. They have left nothing really to be attained by the general surgeon but the cure of fractures and dislocations. They have charge of the vagina. It is a wonder they have not claimed the operation of circumcision also. I think their position, broadly stated, *reductio ad absurdum,* with no offence to anybody, for these gentlemen are my best friends, is sufficient argument for the general surgeon in these cases.

Dr. Baxter closed his remarks by reciting the following lines, improvised by him:

> My liver has abscess, my bladders have stone,
> My bowels are punctured, my arteries are torn,
> But away, you unwashed, and let me alone.
> Your skill counts for naught, and, though soap be plenty,
> Remember these precincts of pelvis and belly
> Are sacred to all, except Mac and Kelly.

Dr. W. D. Haggard, Jr., of Nashville, Tenn.—I consider this subject one of the most interesting that can come before us for discussion. I felt very much gratified when I saw the humorous turn with which Dr. Baxter's remarks concluded. This is a subject upon which there can be no division, and we ought to feel particularly indebted to Dr. McMurtry for his excellent presentation of it. His apology for bringing the subject before us should not, it seems to me, be considered at all. I may be pardoned for taking a personal pride in Dr. McMurtry's paper, because I was fortunate to obtain my first teachings in the religion of cleanliness at his hands. At that time I was infected, to use a paradox, with asepsis, and I think that inoculation has saved a great many of my patients. The first paper I ever read was on "The Technique of Aseptic Surgery as Observed in the Practice of Dr. McMurtry." A little book that is

full of interest for nurses has been written by Dr. McMurtry on that subject, and it should be put into the hands of every nurse, because nurses have much to do with the maintenance of asepsis throughout an operation and in the after-care. The conclusion of Dr. McMurtry's paper was to the effect that our hands are to blame for many of our bad results. That is unquestionably true. At this time we have gotten the sterilization of our instruments by boiling to a perfected state. It is a great consolation to us to know that by dropping our instruments into a boiling solution of 1 per cent. of soda they can be freed from the spores of anthrax in two minutes and from the vegetative forms of any coccus or bacteria in from one to five seconds. This statement is made by Gerster in Dennis's *New System of Surgery.* Having perfected the sterilization of our instruments by boiling and dressings by steaming, the only thing that is difficult is the sterilization of our catgut. I was interested in the remarks of Dr. Kelly, and hoped he would say something more definite about preparation with kumol. I have served an apprenticeship in catgut sterilization by boiling it in alcohol under pressure for two hours. It is a tedious procedure, and I hail with a great deal of delight the intimation of a simpler method by Dr. R. T. Morris, of New York. He prepares catgut by an emulsion in a 2 per cent. solution of formalin for twenty-four hours, which hardens it, and afterward it can be boiled with impunity, and in fifteen minutes it is absolutely trustworthy. I have employed this method because of its simplicity, and it is not necessary for us to have the cumbersome apparatus we have in hospitals. I might state that so far the method has been entirely satisfactory. I have closed the abdomen layer by layer with this catgut, and have had beautiful results. The trouble in boiling catgut is its swelling, and while formalin does not prevent that, it does do so to some degree. When Dr. Morris employs formalin catgut he uses a Hagedorn needle.

I desire to mention one case of trouble from catgut. It was a case of tetanus that I traced unquestionably to the germs of tetanus which were contained in the catgut. The patient was operated on for a large myoma, in the service of Dr. Hanks, with perfect security from hemorrhage. The woman did beautifully until she began, after several days, to develop sepsis, the cause

of which we could not determine. On the seventh day she developed symptoms of tetanus, although it was feared it was strychnine poisoning, and she died in twenty-three hours after the development of tetanus with unmistakable signs and symptoms of that disease. We were employing a new apparatus for sterilizing catgut at the time we began homologous approximation of the abdominal wall by catgut suture, and from this same quantity of catgut there were four consecutive suppurations of the abdominal wound, this being the fourth case which was due to infection from the catgut.

To conclude the consideration of the subject of hand sterilization and disinfection, I must applaud the statements made by Dr. McMurtry. He advocated twenty to thirty minutes' scrubbing of the hands. I have seen him do that, and the case of infection which he believes was caused from his own hands should accentuate the difficulties of hand sterilization. It is true the little pimple was probably the cause. I am sure his hand cleansing is unimpeachable.

Bichloride on the hands in surgery should be classed next to the unclean hand, because it is impossible to render a hand sterile that is chafed and blackened and roughened by immersion in bichloride. I have had nurses suspended from assisting in operations who had chapped hands. Probably the best routine chemical disinfection is with oxalic acid and permanganate of potassium solution. I can commend these.

Lastly, I hope that surgeons and gynecologists will not become divided in regard to their scope of work, but all do clean surgery with clean hands, cleaned by the same method.

Dr. F. W. McRae, of Atlanta, Ga.—I simply wish to join Dr. Baxter in the statement that I believe the general surgeon prides himself upon being just as clean as the abdominal surgeon. There is no foundation in fact whatever for the statement that the general surgeon comes in contact with worse forms of infection than does the gynecological or the abdominal surgeon. It seems to me that the worst varieties of infection they come in contact with are equally as dangerous as those encountered by the general surgeon, in which they have the presence of both micrococci and streptococci, and even in their abdominal operations for the enucleation of pus-tubes they sometimes come in

contact with the most virulent forms of infection. It has not been my observation in the line of general abdominal surgery that the gynecologists whose work I have had the pleasure of watching have gotten better results than the general surgeon. In certain lines of work in my State gynecologists have been much less successful in their work than the general surgeon, notably in operations for appendicitis. General surgeons have uniformly been more successful than abdominal surgeons, and so they have been in operations upon the gall-bladder. It seems to me, if we could not keep ourselves clean as general surgeons, it would be impossible to get these results. But we do get them, and I believe we will continue to do so. I believe very much in what Dr. McMurtry has said in reference to the absolute necessity of personal cleanliness. I do not believe the *ego* should get so much in front of any specialist or class of physicians or surgeons that they can see no merit in other lines of work. I believe every proposition may be reduced to an absurdity, and we are in danger frequently of making such a reduction.

Dr. James A. Goggans, of Alexander City, Ala.—I want to commend the paper of Dr. McMurtry. I thought it was a good one; but he was a little extreme in regard to the length of time which is required to cleanse the hands. I do both general surgery and abdominal surgery, and I wish to put myself on record here as to the results of my work, to give you a general idea of the line of general surgery that I do. I will classify appendicitis as the work of the general surgeon. I have operated on eleven cases of appendicitis, on eighteen cases of empyema of the chest, and a goodly number of most operations that are generally done by the general surgeon; and I have done at least one hundred laparotomies, including hysterectomies and ovariotomies, and I want to say to you that my mortality as a laparotomist is not higher than 7 per cent. Dr. Coley, who is present, will bear me out in this assertion. I do not believe that the general surgeon should consider himself a person who cannot be clean. It is true that I hesitate in going from a case of general surgery to do an abdominal operation, at the same time I believe the general surgeon can do abdominal surgery just as cleanly as anyone can do it.

Dr. McMurtry (closing the discussion).—I am glad the

paper I have presented has elicited such a full and free discussion, and that it has been the means of furnishing the Association with the humor that was presented by my versatile colleague, Dr. Baxter. The purpose I had in presenting the paper was a very simple and plain one. Several years ago all of our meetings dealt very fully and in detail as to operative methods. Discussions about the comparative merits of antisepsis and asepsis were for a long time like the discussions upon chloroform and ether. But these questions have been settled, and there is no difference of opinion among us as to the fundamental principles which underlie wound treatment. But it has become customary to dismiss this subject, and cases are reported from time to time in which it is said "I amputated a limb; I operated for hernia; the operation was done at such and such a time; convalescence was uneventful." Yet we know in all hospitals, in the practice of all surgeons, there are continually occurring cases of wound-infection due entirely to the operative wound itself. That it is not to be attributed to any dereliction on the part of the surgeon, I endeavored to show by quoting from two very prominent clinics in this country—the one of Professor Senn, in which he says that "I am free to confess that I rarely close my day's work without seeing pus, and that in two cases of excision of the breast in private patients," where every facility was at his command, life was lost by the most virulent form of sepsis. I read an extract of a report from a clinic at the Johns Hopkins University in which the cultures from a simple case of hysterectomy for fibroma showed entire freedom from sepsis, and yet the patient died with a virulent form of sepsis, and the reporter admits in a personal letter to me that he believes the patient was infected by the hands of the operator or by those of his assistant. I cited these cases simply as a basis and an explanation of why I should bring the subject before this body for thorough discussion. Moreover, we find different operators have different methods. The basis upon which we are working is as reliable and constant as the multiplication table. The bacteriologic principles which underlie wound-treatment have been worked out, so that there is practically no difference of opinion whatever upon that subject in the profession now. If we can reduce our working methods to the basis of those bacteriologic data with

absolute accuracy, there would be no such thing as post-operative sepsis, and that is the thing we should strive to attain. I endeavored in my paper to reach a definite conclusion as to where is the inconstant, the unknown quantity, in this problem we are endeavoring to solve, and why we should concentrate all our efforts. As a result of it I expressed the belief that it should receive the attention of all operators, that our greatest danger is in hand infection. The instruments can be absolutely sterilized, dressings can be sterilized, and everything pertaining to the operation can be absolutely sterilized except vital parts. The hands of the operator and those of his assistants cannot be immersed in boiling water and kept there sufficiently long to be sterilized; consequently the problem is presented as to how best to treat the hands of the operator and those of his assistants. It was my purpose to draw attention to this subject in order to concentrate this point so as to improve the operative technique. In the discussion which followed I find nothing to reply to, as we are pretty much agreed on this subject. My paper was written from the standpoint of operative surgery, and there is nothing in it directed to one class of surgeons more than any other, and the remarks of Drs. McRae and Goggans as applied to my paper were entirely irrelevant and were evoked by a remark of Dr. Kelly which has been misconstrued.

BULLET-WOUNDS OF THE ABDOMEN.

By W. E. Parker, M.D.,
New Orleans.

While the question as to whether we should operate or not in cases of gunshot-wounds of the abdomen has been quite positively decided in the affirmative by a large majority of leading surgeons, there are many questions as to the technique and after-treatment that are open to debate. It is with the hope of bringing up a discussion of some of these questions that this paper is presented. Then, too, any large number of cases must teach some lessons, and the writer has seen about fifty of these cases operated upon. Of this number thirteen were operated upon by himself. Unfortunately, the history of cases at the Charity Hospital has been so badly kept that the records of many of these cases occurring in the service of the late Prof. A. B. Miles and of Drs. J. D. Bloom and S. M. Fortier have been lost, so are not included in the accompanying table. This paper, as indicated by its title, will discuss bullet-wounds, and not those caused by bird-shot. The writer has frequently thought that the tables presented with many of the papers on this subject were faulty in that there was no classification according to the time after injury, before laparotomy, and the organs injured. Unless some such classification is made we can tell but little as to what we can expect in any given cases. Surely, the late case that has suffered from prolonged hemorrhage or that has peritonitis should not be classed with the recent case in which all of the conditions are more favorable. It has, therefore, seemed proper to make a table according to the time after injury and the organs injured. We have

classed these cases into the early, intermediate, and late cases, and have fixed the time as within seven, fourteen, and after fourteen hours for these divisions. If it does nothing else, it will tend to show us that he who waits for "symptoms" in these cases frequently waits to sign a death certificate. With the hope of getting as large a collection of cases as possible, letters were sent to most of the more prominent surgeons in this country, and I am under special obligations to those who answered. Through the writings of Sims, Kinloch, McGuire, Bull, Barrow, Senn, Miles, Coley, Robinson, Kocher, Morton, and others much has been done to advance this department of surgery. The percentage of recoveries with laparotomy is so much better than without operation that it is no longer a question of, Shall we operate? but, When shall we operate? To this question our reply would be, just as soon as the diagnosis and proper arrangements for the operation can be made. While most surgeons are pretty well agreed on this point, there is a great deal to be done in the way of teaching physicians not to "wait for symptoms" before calling the surgeon. We should try to impress the necessity of early operation, and the much improved prognosis in cases so treated. With these preliminary remarks we will proceed to a discussion of our subject.

The diagnosis is, as a rule, made without any special difficulty. Shock may or may not be present, and gives but little indication of the extent of the visceral injury. We have seen several cases in which there was but little shock, and yet there were numerous intestinal perforations. Our experience with these cases has led us to believe, when shock is present to a marked degree, that hemorrhage is associated with it. Although most writers tell us that pain is in no way characteristic of these cases, the most constant symptom that we have observed has been pain referred to the umbilicus. We have never seen a case of penetrating gunshot-wound of the abdomen in which this symptom was absent, and of such importance have we learned to regard it that in cases in which the bullet entered between the ribs, and the

diagnosis was, therefore, somewhat doubtful, its presence or absence has determined our plan of treatment. If the stomach has been injured, the patient frequently vomits. In any doubtful cases a probe should be introduced along the track of the bullet and the wound enlarged down to the peritoneum, if necessary. While Senn's hydrogen-gas test has been successful in the hands of its distinguished introducer and of some other operators, it has failed when used by several other careful observers, and it seems to the writer that there are several very decided disadvantages to be overcome. Among these may be mentioned the following:

1. But few of us are prepared to use it at once, so some delay would be caused.

2. Fecal matter may be forced by it into the general cavity.

3. It would not show wounds of the solid viscera or mesentery.

4. The distention would cause delay in replacing the intestines and make their reduction more difficult.

5. In a fair proportion of these cases, even if none of the viscera are wounded, the hemorrhage from mesenteric wounds is enough to demand a laparotomy. Several cases in the accompanying table that had no visceral injury had incipient peritonitis when operated upon, and I recall a similar case, operated upon by a colleague of this city. These cases would not have been discovered by this test, and yet an early laparotomy was the thing to have been done.

Now, as to the technique. Of course, it is not necessary to speak here of the preparation of the parts to be operated upon or of the surgeon and his assistants.

The incision should be made in the median line, as we can get a better view of the abdominal contents and are not so likely to cause a hernia. However, if the wound is far to one side the incision should be made accordingly. Wounds of the intestines, stomach, bladder, and mesentery should be closed with fine Czerny-Lembert sutures. In suturing the intestines the line of sutures should, when possible, be in the long axis of the bowel, as this diminishes the risk of

obstruction. Silk is the best suture material here. Even though there may be many perforations of the intestines, the bowel should not be resected unless its calibre is diminished one-half or there should be a large mesenteric wound near it. When resection is necessary the Murphy button is probably the quickest and best way to do it. It is a wise precaution to examine the bowel from end to end. The best way is to start at the ileo-cæcal valve and rapidly pass the small bowel through the fingers. After that the large bowel, if it should be necessary. The incisions in these cases should be large enough to command a good view of the viscera.

Wounds of the liver. As a rule, there is a good deal of hemorrhage with these injuries. The two plans of treatment that have been most generally tried have been stitching and packing. Of these we much prefer packing. It is more easily and quickly done and is surer to control hemorrhage. Stitching is sometimes difficult, and the sutures frequently pull out.

If the gall-bladder has been wounded, it should be closed with the Czerny-Lembert suture or stitched to the abdominal wall, as may be indicated in any given case.

Wounds of the spleen. Here, too, the great danger is hemorrhage. Our method of procedure would depend very largely on the character of the wound. If the wound is large, a splenectomy is necessary; if the wound is not very large, it should be packed with gauze or sutured, as was done in Tiffany's remarkable case.

Wounds of the kidney. The great dangers in this class of cases are hemorrhage and sepsis, as Keen has well pointed out. If there is a probability, and there usually is, of any other organs being wounded, laparotomy should be done and these wounds treated in the usual way. Then comes the question as to what should be done with the kidney. If the pelvis has not been injured and the hemorrhage is not great, the kidney should be left and treated extraperitoneally, any necessary drainage being made through the lumbar region;

if the pelvis has been injured or the hemorrhage is great, a nephrectomy should be done at once.

If the ureter is wounded, an end-to-end anastomosis should be tried; if this is not possible, a nephrectomy should be done at once. As these patients do better if the stomach is empty, it has been suggested that we should wash out the stomachs of all the cases. If the stomach is full, we believe this to be a good plan, but do not think that it should be done until the laparotomy has been completed.

Drainage is seldom necessary. It is indicated in late cases and in those in which we fear hemorrhage. If all hemorrhage has been stopped, we believe that the abdomen should be closed without drainage. Hot water should be freely used in the abdomen during the operation.

The abdominal wound should be closed with through-and-through silver-wire sutures. In concluding the discussion of this branch of my subject I would say that if asked what two things are specially conducive to success in this class of cases, my reply would be to get into and out of the belly as soon as is consistent with good work, and to use plenty of hot water. It can be readily understood that these two things lessen shock.

If the bullet is easily found, it should be removed; otherwise it should be left, as a search for it would probably do more harm than the bullet would.

There are several conditions that modify prognosis. Among these may be mentioned: 1. The habits of the patient. Unfortunately, many of these patients are alcoholics and under the influence of alcohol when we get them. 2. The condition of the alimentary canal. All operators are agreed that if the alimentary canal is empty the prognosis is improved. 3. The age of the patient. Young adults stand these operations better than the old or very young. 4. The physique of the patient. Very fat people do not stand these operations so well as those of good physique or the lean. 5. The larger the bullet the larger the wound. Therefore, the prognosis is grave.

Prognosis. The table here presented is the basis of what

is here said on the subject of prognosis. Some of the cases involving wounds of several organs are not discussed here, but the table will show them. There were many surprises for us in the totals. We believe that the mortality, as shown by these tables, is too high. Many of the cases in the accompanying table were among the earlier reported cases. Morton's table of 110 cases shows a mortality of about 67 per cent. Coley collected 165 cases, and the mortality was 67.2 per cent. His statistics are of special interest, as he has made a table according to the organs injured, but without special reference to time. Of the total number there were 54 recoveries and 111 deaths. Of his total there were 81 cases in which the small intestine was wounded. Of this number 25 recovered and 56 died, or a mortality of 67.5 per cent. There were 24 cases of wounds of the stomach, with 6 recoveries, or a mortality of 75 per cent.; 36 wounds of the large bowel, with 12 recoveries, or a mortality of $66\frac{2}{3}$ per cent.; 19 cases of wounds of the liver, with a mortality of 58.8 per cent.; 11 cases of wounded kidney, with a mortality of 90.9 per cent. Uncomplicated cases of wounds of the small intestine showed a mortality of $66\frac{2}{3}$ per cent., and when complicated by other viscera the mortality was 70 per cent. Our own experience had led us to believe that the percentage of recoveries in cases of wounds of the small intestine was better. The table here presented shows that of 40 cases operated upon in the first seven hours, 19 recovered and 21 died. Of this number a perforation was overlooked in 1, so if this case is eliminated we would have 19 recoveries and 20 deaths, or a mortality a little less than 52 per cent. Of the intermediate cases, of the cases operated upon between seven and fourteen hours after the injury, 1 out of 5 recovered, or a mortality of 80 per cent.; of the late cases 4 out of 22 recovered, or a mortality of $81\frac{9}{11}$ per cent., making a total of a little less than 64 per cent. as the mortality for all uncomplicated cases. Of the uncomplicated cases of wounds of the large intestine operated upon within seven hours, we find that there were 8 cases, of which 6 recovered

and 2 died, making a mortality of but 25 per cent. Of those operated upon between seven and fourteen hours, 1 recovered and 1 died. Both of the late cases died, so of the 12 cases operated upon 7 recovered and 5 died, or a mortality of about 43 per cent.

Stomach wounds, uncomplicated, show a much better table than we had supposed. Ten cases were operated upon within seven hours. Of this number 7 recovered and 3 died, and in one of these a perforation was not sutured. If this case is omitted, we would have a mortality of about 23 per cent. Five cases were operated upon after fourteen hours, with but 1 recovery, or a mortality of 80 per cent. Eight cases of wounds of the large and small bowel were operated upon within seven hours, of which 4 recovered and 4 died, or a mortality of 50 per cent. Seven cases were operated upon between seven and fourteen hours after injury, with 1 recovery and 6 deaths. In one of these cases a perforation of the rectum was overlooked, so if this case is omitted we would have a mortality of $83\frac{2}{3}$ per cent. Four were operated upon after fourteen hours, 1 of them recovering. Seven cases of wounds of the small intestine and stomach were operated upon within seven hours, of which 3 recovered and 4 died, or a mortality of 57 per cent. Fourteen cases required resection of the bowel. Of this number 2 recovered and 12 died. In one of these a perforation of the bladder was overlooked. If this case is omitted, we would have a mortality of a little less than 85 per cent. There were 12 uncomplicated cases of wounds of the liver, of which number 8 recovered and 4 died, or a mortality of $33\frac{1}{3}$ per cent. There were 9 cases of wounds of the liver and kidney, of which 3 recovered and 6 died. Two of 4 cases packed recovered, while but 1 out of 5 in which nephrectomy was done recovered. There were 3 cases of wounds of the kidney and small intestine, of which 1 recovered. Of 2 cases of wounds of the spleen and kidney, 1 recovered. Of 2 cases of wounded kidney uncomplicated by wounds of other organs, 1 recovered. There were 3 cases in which the small

intestine and iliac vessels were wounded, and all died. The table will show the results met in some of the more complicated cases, the number of each set being too small to record in this section. We believe that as we learn more of these cases that the prognosis will improve. The results, in the hands of most surgeons, improve as the number of cases treated by them increases. In our humble opinion the day is not very far distant when, in the hands of skilled abdominal surgeons and under proper aseptic conditions, 75 per cent. of cases of uncomplicated wounds of the intestines and stomach will recover if operated upon in the first seven hours.

After-treatment. The after-treatment of cases of gunshot-wounds of the abdomen, while in many ways like that of other cases of abdominal surgery, is as important as anything connected with this class of cases.

One of the first lessons that we learned about these cases, taught by a patient of the late Dr. A. B. Miles, while the writer was an interne in his service at the Charity Hospital, was the necessity of giving alcohol to alcoholics. Probably the best way is to give brandy hypodermatically during the earlier days after the operation.

The time when feeding should be commenced depends very largely on the condition of the stomach. If the stomach has not been wounded and is quiet, it has been our practice to commence with teaspoonful doses of Ducro's elixir hourly at the end of the first twenty-four hours. If the stomach is unsettled or has been wounded, all feeding should be done by the bowel. If the large intestine has been wounded and the stomach is unsettled, food should be withheld for a time. During the first few days but little nourishment should be given by the stomach, and nothing but liquids for at least ten days. During this time chicken, beef- or mutton-broth, milk with lime-water, and Ducro's elixir or some of the beef peptonoids should be given. When solids are commenced they should be given very cautiously.

Heart stimulants should be given when indicated. It has been our practice to give strychnine in all cases. If the

heart is fast or weak, the tincture of digitalis has been freely used. For the collapse and copious sweating that is sometimes seen in these cases soon after the operation, nothing, in our opinion, equals the sulphate of atropine. We have generally given this in the dose of gr. 1-60, and repeated it in three or four hours if necessary.

Opiates should not, under ordinary circumstances, be used; but if the patient is restless and suffering soon after the operation, a sixth of a grain of morphine should be given. Much depends on starting these cases right, and it certainly does them no good to toss about in bed.

When shall we give a purgative? This is frequently an important question to decide. Ordinarily the bowels will move spontaneously on the sixth or seventh day. If they do not, an enema should be given about the eighth day. If they still do not act satisfactorily, a gentle purgative in broken doses should be given. When a purgative is necessary we use the sulphate of magnesium in doses of a teaspoonful every hour until the bowels act.

In conclusion, we would like to quote and indorse the following little extract from Miles's paper, published about four years ago: "If the operation of enterorrhaphy be done before general peritonitis supervenes, and done quickly, cleanly, and thoroughly, with judicious after-treatment, the patient has more than even chances for recovery now, and surely these chances will be improved in coming years."

Below are some notes on the thirteen cases that have come under the care of the writer:

Case I.—Native of France, male, aged twenty-one years. Was admitted to Charity Hospital in October, 1894. In a fit of despondency he shot himself in the left hypochondriac region with a 32-calibre pistol; was brought to the hospital within an hour. Diagnosis of penetrating wound of the abdomen was made, and laparotomy done at once. Considerable blood and two perforations of the colon were found. The wounds were sutured and the cavity flushed. The abdomen was then closed without drainage. He did well for

five days ; on the morning of the fifth day he got out of bed and onto the commode to have an action, while the nurse was temporarily out of the ward. He was quickly put back into bed. About three hours later he got out of bed and went to the water-cooler for some water. He was put into bed and complained of pain in the region of the wound, and that afternoon died rather suddenly. Autopsy was held, the perforations were closed, and there was no peritonitis. Better nursing might have saved him. But what was the cause of death ?

CASE II.—Louis S., white, male, aged fifty-six years, was admitted to Charity Hospital January 15, 1895, having been accidentally shot in the epigastric region about an hour before. Pulse about 100, but good. The diagnosis of penetrating wound was made, and an incision in the median line to the umbilicus was made. There was so much blood in the cavity that it was thought that the liver had been wounded. A cross incision was made so as to expose the parts better. No wound of the liver was found, but a large wound near the pylorus was found, and this was bleeding freely. The wound was sutured and the cavity well flushed. The patient made a good recovery, but the cross incision healed rather slowly. He was discharged cured, about two months after admission.

CASE III.—John H., negro, aged about forty-five years, was admitted to the Charity Hospital November 8, 1894. The day before admission he had been shot in the right hypochondrium. When admitted his pulse was about 120 and respirations about 40. Notwithstanding the fact that he was quite tympanitic, we decided to operate. A median and cross incision were made. Two perforations of the hepatic flexure of the colon and a large wound of the liver were found. There was a good deal of blood, and well advanced symptoms of peritonitis were present. The wounds of the colon were sutured, the cavity flushed, and gauze packed into the liver wound. He lived about thirty-six hours and died from peritonitis.

CASE IV.—James T., aged about twenty-five years, white,

was admitted to the Charity Hospital, March, 1895, suffering from gunshot-wound of the right iliac region. Wound had been received about an hour before. The patient was prepared for operation and the bullet wound enlarged. Some blood was found, but no visceral injury. The cavity was flushed, and the patient made an uninterrupted recovery. This case would probably have recovered without laparotomy.

CASE V.—Joseph B., aged twenty-one years, white, was admitted to the Charity Hospital January 1, 1895. About one hour before had received a wound from a 38-calibre pistol ball about an inch below and two inches to the left of the umbilicus. Laparotomy was done at once. Fifteen perforations of the small intestine and eight of the mesentery were found, the bullet lodging in the bowel. There was a good deal of blood in the cavity. All wounds were sutured and the cavity flushed. Although he was somewhat restless the first night, he subsequently did very well until the sixth day. The evening of the fifth day his temperature, pulse, and respiration were normal. The sixth day he was restless and his temperature went to 101° F. The wound was dressed that afternoon, and it was found that one of the wires in the abdominal wound had given away. He died on the eighth day from peritonitis. The autopsy showed all intestinal wounds water-tight and none overlooked.

CASE VI.—Joseph A., German, aged about thirty years. Admitted November 9, 1895, having received a gunshot-wound in the right iliac region about an hour before admission. There was no shock. The wound was enlarged and a single perforation of the ileum was found. This was sutured and the cavity flushed. He did well for about thirty-six hours, when he complained of some pain in the back. Thinking that it was simply a little pain around the bullet, I did not examine his back. That night his condition was hopeless, and he died about forty-eight hours after the injury. The autopsy showed the wound healed, no peritonitis, and no other wound, but what to me was a very unusual condition. The bullet had passed between the folds of the mesentery

and through the ilium, lodging in the muscles of the back. There was what appeared to be a gangrenous cellulitis extending from the right scapula to the hip. Free incisions might have helped him.

CASE VII.—John W., aged about thirty years, white, male, was admitted to the Charity Hospital September 17, 1895, suffering from gunshot-wounds of the epigastric and umbilical regions and of the left lung, having been shot three times. Was very drunk at the time of injury. Was brought to the hospital within an hour and laparotomy done at once. Numerous wounds of the small intestine—two of the stomach and one of the left lobe of the liver—were found. There was a good deal of extravasation from the stomach, and he took the chloroform very badly. He died in about five hours.

CASE VIII.—Vincent C., Italian, aged about forty years, was admitted to the Charity Hospital September 17, 1895. About sixteen hours before he had received a pistolshot-wound, the bullet having entered through the crest of the ilium of the right side. Symptoms of peritonitis were marked. Laparotomy was done at once, and fourteen wounds of the ilium found. There was a good deal of blood in the cavity. The patient died on the third day from peritonitis.

CASE IX.—Harry A., aged fifteen years, colored, was admitted to the Charity Hospital January 1, 1896. About one hour before he had received a pistolshot-wound in the umbilicus, the bullet being of a 22-calibre. His condition was very good, the pulse being about 90. He was at once prepared for a laparotomy, and the median incision made. Eleven perforations of the small intestine and four of the mesentery were found. There was a good deal of hemorrhage from a mesenteric artery which was spurting. The wounds were closed with the Czerny-Lembert suture and the artery ligated. At the end of twenty-four hours his pulse was 140 and temperature 103°. It fell the next morning, and he made an uninterrupted recovery, being discharged cured about a month later.

CASE X.—Henry A., negro, aged about thirty years, was

admitted to the Charity Hospital February, 1896. About one hour before he had received a gunshot-wound of the abdomen, the bullet entering about one inch above and to the left of the umbilicus. Laparotomy was at once done, and six perforations of the jejunum and four of the mesentery found. These were sutured and cavity flushed. He made an uneventful recovery, and was discharged cured about five weeks later.

CASE XI.—Willie J. was admitted to the Charity Hospital March 8, 1896. Negro, male, aged about forty years. About an hour before his admission he was shot in the right hypochondrium. The wound was enlarged and two perforations of the duodenum found. One was very large, the gut having been ripped for about one and one-half inches. The wounds were sutured and the cavity flushed. He made an uneventful recovery, and was discharged April 7th.

CASE XII.—Charles S., aged about twenty-five years, negro, was admitted April 20, 1896, having been shot about one hour before. The wound of entrance was a little to the right of the umbilicus. A laparotomy was done at once. Four perforations and a graze wound of the small intestine were found. These were all sutured and the cavity flushed. The patient also had a gunshot fracture of the ulna. Except for a temperature of about 101° on the third day, he made an uneventful recovery and was discharged May 11th.

CASE XIII.—Thomas M., aged twenty-one years; white, male; was admitted to the Charity Hospital May 10, 1896. About an hour before admission he had received a pistolshot-wound, the bullet entering about the tenth rib. Had vomited freely, blood being mixed with food and beer. He was very drunk. Laparotomy was done at once. The stomach had been wounded, but the wounds were so high that the anterior perforation was sutured with great difficulty, and the lower one could not be brought into view. The operation was necessarily an unsatisfactory one, and the patient died three days later, on May 13th.

In concluding my paper I beg leave to express my thanks

to Drs. Charles T. Pollard and J. L. Burthe for assistance in arranging these tables and collecting data as to my own cases. I also wish to thank the following gentlemen for replies to my circular letter: Drs. W. T. Bull, J. B. Murphy, J. W. Elliott, W. W. Keen, Hunter McGuire, Hugh M. Taylor, George H. Noble, O. L. Shivers, Roswell Park, James Kerr, A. M. Cartledge, W. E. B. Davis, John D. S. Davis, A. M. Owen, R. B. Maury, J. M. Maury, R. D. McIlwaine, Stuart McGuire, V. O. Hardin, T. E. Schumpert, W. M. Mastin, D. M. Prince, J. H. Packard, L. A. Sayre, George Ben Johnston, W. B. Coley, H. H. Grant, R. Winslow, F. H. A. Beach, W. S. Elkin, H. H. Mudd, H. G. Mudd, R. J. Nunn, J. L. Dawson, Duncan Eve, Edwin Walker, George S. Brown, S. H. Weeks, W. H. Carmalt, W. F. Westmoreland, P. S. Conner, W. B. Rogers, R. R. Kime, W. Frank Glenn, W. S. Bickham, O. H. Allis, M. H. Richardson, George H. Rohé, B. W. Taylor, L. M. Tiffany, Edward McGuire, J. T. Wilson, E. H. Sholl, John A. Wyeth, J. Wesley Bovée, George W. Gay, H. Schilling.

Wounds of Large and Small Intestines Operated on after Fourteen Hours.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	H. H. Mudd,	18 hrs.	2 of colon; 2 of ileum.	Suture.	Died.	Personal letter.
2	A. M. Cartledge,	18 hrs.	7 perforations of small bowel; 1 of sigmoid flexure; peritonitis.	Suture.	Died in 48 hrs.	Personal letter.
3	A. V. Park,	22 hrs.	Hemorrhage; ½-inch wound of small bowel and graze of rectum.	Suture.	Died.	Morton.
4	N. T. Bull,	17 hrs.	5 of small, 1 of sigmoid flexure.	Suture.	Recov.	Morton.

Wounds of Liver and Kidney.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	Jno. W. Elliott,	2 hrs.	.....	Packed.	Recov.	Personal letter.
2	M. Price,	24 hrs.	.....	Nephrectomy.	Recov.	Morton's table.
3	J. E. Sommers, Jr.,	24 hrs.	.....	Packed.	Died.	
4	L. M. Tiffany,	Soon.	.....	Packed.	Died.	
5	M. H. Richardson,	14 hrs.	.....	Nephrectomy	Died.	Annals of Surgery.
6	M. H. Richardson,	7 hrs.	.....	Packed.	Recov.	Annals of Surgery.
7	S. M. Fortier,	Soon.	.....	Nephrectomy.	Died.	
8	S. M. Fortier,	Soon.	.....	Nephrectomy.	Died.	
9	S. M. Fortier,	.....	.....	Nephrectomy.	Died.	

Liver and Large Intestine.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	H. G. Mudd,	5 hrs.	1 of liver; 2 of hepatic flexure.	Sutured and packed.	Recov.	Personal Letter.
2	J. B. Murphy,	Few hours.	.....	Sutured.	Recov.	Reprint of his article.

WOUNDS OF SMALL INTESTINE OPERATED WITHIN SEVEN HOURS.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	A. R. Kinloch,	2½ hrs.	4 of ileum; 2 of jejunum mesenteric artery; 2 of mesentery.	Suture.	Died.	Morton's table.
2	Cupples,	1½ hrs.	4 of small intestine.	Suture.	Died.	Died in 1½ hours.
3	R. Park,	6 hrs.	2 of small intest.; 1 of mesentery.	Suture.	Died.	Morton's table.
4	C. E. Bell,	2 hrs.	7 perforations.	Suture.	Recov.	Morton's table.
5	Link,	Soon.	4 of ileum; 2 of mesentery.	Suture.	Recov.	Morton's table.
6	F. J. Lutz,	3 hrs.	4 of small intest.; 6 of mesentery.	Suture.	Died.	Morton's table.
7	J. D. Griffith,	6 hrs.	3 of small intest.	Suture.	Died.	Morton's table.
8	D. Barrow, Jr.,	3½ hrs.	7 of small intest. 5 of mesentery.	Suture.	Died.	Morton's table.
9	L. A. Stimson,	7 hrs.	6 of small intest.	Suture.	Died.	Kerr's table.
10	Greenshield,	5 hrs.	Wound of ileum; small artery ligated.	Suture.	Recov.	Kerr's table.
11	A. E. Spohn,	1 hr.	4 of intestine, and several mesenteric	Suture.	Recov.	
12	J. H. Williams,	4 hrs.	1 of ileum.	Suture.	Recov.	Kerr's table.
13	E. M. Robinson,	3 hrs.	2 of intestine and 1 of mesentery.	Suture.	Died.	Kerr's table.
14	N. Senn,	4 hrs.	11 of small intest.	Suture.	Recov.	Kerr's table.
15	W. E. Parker,	1 hr.	19 of intestines. 4 of mesentery.	Suture.	Died.	Died on 8th day.
16	W. E. Parker,	1 hr.	1 of ileum.	Suture.	Died.	Gangrene of back.
17	W. E. Parker.	1 hr.	11 of ileum. 4 of mesentery.	Suture.	Recov.	
18	W. E. Parker.	1 hr.	2 of jejunum.	Suture.	Recov.	1 wound was 1½ in. long.
19	W. E. Parker.	1 hr.	6 of jejunum; 4 of mesentery.	Suture.	Recov.	
20	W. E. Parker.	1 hr.	4 perforating; 1 graze wound.	Suture.	Recov.	
21	D. Barrow,	4 hrs.	7 of intestines; 5 of mesentery.	Suture.	Died in 3 hours.	
22	W. M. Mastin,	4 hrs.	6 of small intest.; 5 of mesentery.	Suture and ligature.	Died in 32 hours after operation.	Pers. letter.
23	H. H. Mudd,	3 hrs.	2 of small intest.	Suture.	Died.	Pers. letter.
24	H. G. Mudd,	2 hrs.	6 of ileum.	Suture.	Recov.	Pers. letter.
25	H. G. Mudd,	3 hrs.	1 of small intest.	Suture.	Recov.	Pers. letter.
26	A. B. Miles,	Soon.	8 of small intest.	Suture.	Recov.	Notes by Dr. H.B.Gessner.
27	A. B. Miles,	1 hr.	5 of small intest.; 2 of mesentery.	Suture.	Died in 48 hours.	Notes by Dr. H.B.Gessner.
28	A. M. Cartledge,	2 hrs.	6 of small intest.	Suture.	Died in 48 hours.	Pers. letter.
29	James Kerr,	4 hrs.	Intestine and mesentery.	Suture.	Died in 48 hours.	Pers. letter.
30	Roswell Park,	6 hrs.	7 punctures.	Suture.	Died 4th day of pericarditis.	Pers. letter.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
31	R. Winslow,	Soon.	5 of ileum. 3 of mesentery.	Suture.	Died 5th day; one perforation overlooked.	Pers. letter.
32	S. H. Weeks,	3 hrs.	3 of small intest.	Suture.	Recov.	Pers. letter.
33	W. H. Carmalt,	3 hrs.	4 of small intest. 1 of mesentery.	Suture.	Recov.	Yale Med. Journ.
34	A. B. Miles,	1 hr.	7 perforations.	Suture.	Died; no peritonitis.	Ann. Surg.
35	A. B. Miles,	1 hr.	16 perforations; 3 of mesentery.	Suture.	Recov.	Ann. Surg.
36	A. B. Miles,	1 hr.	21 perforations; 2 bullets.	Suture.	Died of shock same day	Ann. Surg.
37	A. B. Miles,	1 hr.	3 perforations; 1 of mesentery.	Suture.	Recov.	Ann. Surg.
38	A. B. Miles,	1 hr.	5 perforations; 3 of mesentery.	Suture.	Died.	Ann. Surg.
39	A. B. Miles,	About 7 hrs.	14 perforations of jejunum.	Suture.	Recov.	Ann. Surg.
40	A. B. Miles,	1 hr.	10 perforations of jejunum.	Suture.	Recov.; saline infusion.	Ann. Surg.
41	W. T. Bull,	2½ hrs.	2 of small intest.; 3 mesocolon.	Suture.	Recov.	Morton.

Wounds of Large and Small Intestines Operated on in Less than Seven Hours.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	A. B. Miles,	Soon.	1 of colon; 3 of jejunum.	Suture.	Died in 3 hrs.; hemorrhage.	Dr. Gessner.
2	T. Annandale,	1 hour.	5 of small intest.; 2 of colon; 2 of rectum; 1 of mesentery.	Suture.	Died in 24 hrs.	Morton.
3	W. T. Bull,	6 hours.	2 of small intest.; 2 of colon; 2 of descend. colon.	Suture.	Died in 8 hrs.	Morton.
4	C. Kollock,	6 hours.	1 of ileum; bleed. epip. app.	Suture ligature.	Recov.	Morton.
5	Jos. M. Fox,	3½ hrs.	4 of colon and jejunum.	Suture.	Recov.	Morton.
6	D. Barrow,	4 hours.	4 of small and 2 of large intestine.	Suture.	Recov.	Kerr's table.
7	D. Barrow,	4 hours.	2 of ileum and 3 of cæcum.	Suture.	Died; abdm. reopened.	Kerr's table.
8	J. Ahern,	5 hours.	7 of small and 3 of large intestine.	Suture.	Recov.	Kerr.

Wounds of Large and Small Intestines Operated on after Seven and within Fourteen Hours.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	L. A. Stimson,	9 hours.	1 of small and 2 of large intest.; 1 of mesentery.	Suture.	Cured.	N. Y. Med. Journ.
2	J. H. Dunn,	12 hrs.	13 of small intest.; 3 of mesentery; 1 of rectum.	Suture.	Died.	N.W. Lancet, 1889.
3	R. D. McIlvaine,	8 hours.	6 of small and 2 of large intestine.	Suture.	Died on 3d day.	Pers. letter.
4	R. Winslow,	Few hours.	6 perforations of small intest.; 1 of cæcum; 5 of mesentery.	Suture.	Died; 1 perforation overlooked.	Pers. letter.
5	A. R. Kinloch,	11 hrs.	5 of small intest.; 2 of mesentery; 1 of rectum.	Suture.	Died; perforation of rectum overlooked.	Morton's Rep., 1889.
6	R. Douglas,	8 hours.	4 of small intest.; 2 of colon.	Suture.	Died.	Morton.
7	J. H. Dunn,	13 hrs.	13 of small intest.; 3 of mesentery; 1 of rectum.	Suture.	Died.	Kerr's table.

Wounds of the Kidney.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	A. M. Cartledge.	30 hrs.	Right kidney; symptoms of peritonitis.	Irrigation	Cured.	Pers. letter.
2	De F. Willard.	4 hours.	Left kidney; large hæmatoma; bullet in aorta.	Nephrectomy.	Died.	Morton's table.

Kidney and Small Intestine.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	J. B. Murphy,	2 hours.	Pelvis of kidney; renal artery; 4 of small intestine.	Suture.	Died.	
2	C. T. Parke,	5 hours.	Left kidney; 5 of small intestine.	Suture.	Died.	Morton's table.
3	Mayo.	?	Kidney; omentum; pleura.	Suture.	Recov.	Morton's table.

Kidney and Spleen.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	L. M. Tiffany.	?	Spleen and kidney.	Suture.	Recov.	
2	L. M. Tiffany.	?	Spleen and kidney.	Suture.	Died.	

Wounds of Liver and Large Intestine.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	H. G. Mudd,	5 hours.	1 of liver; 2 of hepatic flexure.	Packed and sutured.	Recov.	Pers. letter.
2	J. B. Murphy,	Few hours.	Liver.	Sutured.	Recov.	Pers. letter.

Wounds of Liver and Kidney.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	Jno. W. Elliott,	2 hours.	Liver and kidney.	Liver wound packed.	Recov.	Pers. letter.
2	M. Price,	24 hrs.	Liver and kidney.	Nephrectomy.	Recov.	Keen's paper.
3	J.E.Sommers,Jr.,	24 hrs.	Liver and kidney.	Packed.	Died.	Keen's paper.
4	Tiffany,	Soon.	Liver and kidney.	Packed.	Died.	Keen's paper.
5	M.H.Richardson	14 hrs.	Liver and kidney.	Nephrectomy.	Died.	Keen's paper.
6	M.H.Richardson	?	Liver and kidney.	Packed.	Recov.	Keen's paper.
7	S. M. Fortier,	Soon.	Liver and kidney.	Nephrectomy.	Died.	
8	S. M. Fortier,	Soon.	Liver and kidney.	Nephrectomy.	Died.	
9	S. M. Fortier,	Soon.	Liver and kidney.	Nephrectomy.	Died.	

Wounds of Liver and Small Intestine.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	T. E. Schumpert,	3½ hrs.	2 of duodenum; 1 of liver.	Packed.	Died.	Pers. letter.
2	Jno. W. Elliott,	4 hours.	Liver and small intestine.	Perfor'n closed; piece of liver removed.	Died.	Pers. letter.
3	W. S. Rodman,	6 hours.	2 of small intes.; 1 of liver.	Sutured.	Died.	Pers. letter.

No Intestinal or Visceral Injury.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	W. M. Mastin,	12 hrs.	None.	Cavity sponged.	Cured.	Pers. letter.
2	R. D. McIlvaine,	2 hrs.	None.	Cavity sponged.	Cured.	Pers. letter.
3	A. B. Miles,	Soon.	1 mesentery.	Suture.	Cured.	Dr. Gessner.
4	James Kerr,	3 hrs.	Wound of omentum.	Suture.	Cured.	Pers. letter.
5	Geo. S. Brown,	3 hrs.	Mesentery.	Suture.	Cured.	Pers. letter.
6	Geo. S. Brown,	3 hrs.	No perforation.	Suture, with iodoform.	Died, shock & hemor'ge	Pers. letter.
7	J. I. Skelly,	1 hr.	2 peritoneal, inten. peri.	Dusted with iodoform.	Recov.	Morton.
8	J. M. Gaston,	4 days.	Decomposing clot.	Flushed, intestine punct'd to let out gas.	Died.	Morton.
9	G. S. Brown,	12 hrs.	Decomposing clot.	Flushed, drained.	Cured.	Med. News, Feb. 1888.
10	C. Fenger,	6 days.	Decomposing clot, peritonitis.	Flushed, drained.	Died.	Morton.
11	J. M. Barton,	2 hrs.	None.	Flushed, drained.	Died.	2 of stomach at post-mort.
12	C. Fenger,	3 hrs.	None.	Flushed, drained.	Recov.	
13	D. Barrow,	6 hrs.	None.	Irrigat'n.	Recov.	
14	J. O'Brien,	2 hrs.	None.	Irrigat'n.	Recov.	Kerr.
15	N. Senn,	7 hrs.	None.	Irrigat'n.	Recov.	Kerr.
16	W. G. Parker,	1 hr.	None.	Irrigat'n.	Recov.	

Wounds of Stomach and Small Intestine Operated on before Seven Hours.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	A. B. Miles,	Soon.	2 of stomach; 2 of jejunum.	Suture.	Cured.	
2	O. H. Allis,	Soon.	12 perforations of intestines; 2 of stomach.	Suture.	Died in 40 hrs. of peritonitis.	Pers. letter.
3	W. Mackie,	3 hrs.	2 of stomach; 2 of duodenum; 2 of mesentery; 1 of mesocolon.	Suture.	Died.	Morton.
4	N. Senn,	3 hrs.	10 of small intest.; 1 ant.post.rectum.	Suture.	Recov.	Morton.
5	A. C. Bernays,	Soon.	Stomach, duodenum, and jejunum.	Suture.	Recov.	Morton.
6	L. A. Stimson,	Soon.	2 of small intest.; 1 of mesocolon; 1 of post. wall of stomach.	Suture.	Died.	Kerr's table.
7	G. A. White.	5 hrs.	Stomach; 6 of small intest.	Suture.	Recov.	Kerr's table.

Resection of Bowel.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	A. M. Cartledge,	2 hrs.	5 of jejunum.	Murphy button.	Died in 3 hrs. from hemorr.	Pers. letter.
2	John W. Elliott,	3 hrs.	6 or 7 perforations of small intest.; hemorrhage.	Resection	Died.	Pers. letter.
3	S. W. McGuire,	1 hr.	11 perforations.	Resection at two points; Murphy button.	Died, shock in 3 hours.	Pers. letter.
4	George Brown,	Soon.	8 perforations.	Resection	Died, pulseless before operat'n.	
5	A. C. L. Ramsay,	6 hrs.	Extensive wound of duodenum; graze of colon.	Resection	Died in 1 hour.	Morton.
6	Sevastopoulo,	1 hr.	Large wound of small intest.	Resection	Recov.	Morton.
7	C. H. Dalton,	3 hrs	15 of small intest	Double resection and suture.	Died	Morton.
8	A. E. J. Barker,	4½ hrs.	2 of small intest.	Excision and circ. cont. sut.	Died.	Morton.
9	N. B. Carson,	6 hrs.	Small intest.	Resection 2½ in.	Died.	Morton.
10	M. Freger,	6 hrs.	Small intest.	Resection	Recov.	Morton.
11	C. Fenger,	3 hrs.	14 of small intest.; 2 of large intest.; 4 of mesentery.	Resection	Died on table.	Morton.
12	D. Barrow,	4 hrs.	9 of small intest.; several of mesentery.	Resection 4 in.	Died.	Morton.
13	E. W. Moore, Jr.	8 hrs.	5 of intestine; 7 of mesentery; 1 of omentum.	Excision 3 in., rest sutured.	Died.	Morton.
14	C. K. Briddon,	2 hrs.	15 of small intest.	Resection 1½ in.	Died.	Overlooked wound of bladder
15	R. B. Maury,	3 hrs.	Numerous	Resection	Died.	Base of bladder and ureter wounded.

Wounds of Stomach Operated after Fourteen Hours (Perforations).

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	H. H. Mudd,	4 days.	One.	Suture.	Died.	Pers. letter.
2	J. D. Bloom,	20 hrs.	2 perforations.	Suture.	Died.	H. B. Gessner.
3	L. A. Woods,	16 hrs.	2 of stomach.	Suture.	Recov.	Nashville Journ. Med. and Surg.
4	T. Billroth,	32 hrs.	1 of omentum.	Suture.	Died.	Morton's table.
5	C. K. Briddon,	18 hrs.	1 of omentum.	Suture.	Died.	Morton's table.

WOUNDS OF STOMACH OPERATED ON BEFORE SEVEN HOURS.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	T. E. Schumpert,	1¼ hrs.	Two.	Suture.	Cured.	Pers. letter.
2	Jno. W. Elliott,	1 hour.	2 perforations.	Suture.	Cured.	Pers. letter.
3	R. Winslow,	Soon.	1 perforation.	Suture.	Cured.	Pers. letter.
4	A. B. Miles,	1 hour.	2 perforations.	Suture.	Cured.	In service of writer at Charity Hospital.
5	Kocher,	1½ hrs.	2 perforations; hemorrhage.	Suture.	Cured.	
6	N. Senn,	4 hours.	1½ wound of ant. and 1 of posterior wall.	Suture.	Died on table.	Bullet passed through the pancreas and the cord
7	A. T. Cabot,	3 hours.	1 of anterior wall.	Suture.	Recov.	Bost. Med. & Surg. Journ.
8	H. C. Dalton,	6 hours.	2 of stomach.	Suture.	Died.	Fell out of bed and tore out sutures.
9	E. Zimmer,	7 hours.	2 of stomach.	Suture.	Died from wound of spleen.	
10	W. E. Parker,	1 hour.	1 of stomach.	Suture.	Recov.	
11	W. E. Parker,	1 hour.	2 of stomach.	Suture.	Died.	Posterior perforation could not be brought into abdom. wound for suture.

WOUNDS OF LARGE BOWEL OPERATED ON BEFORE SEVEN HOURS.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	H. G. Mudd,	6 hrs.	2 of ascend. colon.	Suture.	Recov.	Pers. letter.
2	John W. Elliott,	1 hr.	1 of colon.	Suture.	Recov.	Pers. letter.
3	A. B. Miles,	1 hr.	1 of colon; 1 of mesentery; 2 of ascending colon.	Suture.	Recov.	Ann. Surg.
4	I. H. Manley.	2 hrs.	2 of colon; 1 of mesentery.	Suture.	Recov.	Morton.
5	David Prince,	1 hr.	Ascending colon.	Suture.	Recov.	Morton.
6	W. O. Roberts,	2 hrs.	4 of colon.	Suture.	Died.	Morton.
7	E. Zimmer,	4 hrs.	2 of colon.	Suture.	Recov.	Kerr.
8	W. E. Parker,	1 hr.	2 of colon.	Suture.	Died.	

WOUNDS OF LARGE BOWEL, AFTER SEVEN TO FOURTEEN HOURS.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	W. W. Lugman,	13 hrs.	3 of colon; 2 of mesocolon.	Suture.	Died.	Morton.
2	I. A. McGraw,	9 hrs.	2 of ascend. colon.	Suture.	Recov.	Morton.

Wounds of Small Intestine after Fourteen Hours.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	H. H. Mudd,	20 hrs.	5 perforations.	Suture.	Recov.	Pers. letter.
2	H. H. Mudd,	24 hrs.	Several.	Suture.	Died.	Pers. letter.
3	Jno. M. Maury,	17 hrs.	3 of ileum.	Suture.	Died in 30 hrs.	Pers. letter.
4	Jno. W. Elliott,	30 hrs.	Perforation small intes.; peritonitis	Suture, drainage.	Died.	Pers. letter.
5	R. Winslow,	18 hrs.	4 of ileum.	Suture.	Recov.	Pers. letter.
6	A. B. Miles,	After 24 hrs.	1 of ileum.	Suture.	Died of periton's at time of operation	Annals of Surgery.
7	A. B. Miles,	About 20 hrs.	6 perforations.	Suture.	Died of periton's at time of operation	
8	Jordan Loyd.	48 hrs.	1 large perforation.	Stitched to abdm. wall.	Died.	Morton's table.
9	C. A. Jersez,	20 hrs.	4 intes.; 2 mesent.	Suture.	Died.	Morton's table.
10	I. Warren,	24 hrs.	5 of small intes.; 2 of mesentery; peritonitis.	Suture, drainage.	Died.	Morton's table.
11	C. P. Parkes,	17 hrs.	Large.	Suture.	Died.	Morton's table.
12	N. P. Dandridge,	19 hrs.	10 perforations.	Suture.	Died.	Morton's table.
13	F. Lange,	24 hrs.	7 perforations.	Suture.	Recov.	Morton's table.
14	Trelat,	22½ h.	2 small.	Suture.	Died.	Morton's table.
15	Labbé,	15 hrs.	10 of ileum; 1 of mesentery; fecal ext.; peritonitis.	Suture, dry.	Died.	Morton's table.
16	A. C. Bernays,	19 hrs.	1 small.	Suture.	Recov.	Morton's table.
17	W. S. Schenck,	16½ h.	9 small; 1 of mesentery.	Suture.	Died.	Morton's table.
18	A. B. Strong,	20 hrs.	4 small.	Suture.	Died.	Morton's table.
19	E. M. Robinson,	20 hrs.	7 small.	Suture.	Died.	Kerr's table.
20	E. M. Robinson,	16 hrs.	4 small.	Suture.	Died.	Kerr's table.
21	N. Senn,	Next day.	5 small.	Suture.	Died.	Kerr's table.
22	W. E. Parker,	16 hrs.	14 small.	Suture.	Died on 3d day.	

Wounds of Small Intestine Operated on in Fourteen Hours.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	T.N. Richardson,	9 hrs.	3 of intestines; 1 of mesentery.	Suture.	Died in 14 hrs.	Morton's table.
2	N. Senn,	12 hrs.	5 of small intest.; 4 of mesentery; peritonitis.	Suture.	Died.	Morton's table.
3	I. S. Wintermuter	8 hrs.	7 of ileum.	Suture.	Died.	Kerr's table.
4	Jonas Kerr,	12 hrs.	8 wounds.	Suture.	Recov.	Pers. letter.
5	F. J. Lutz,	10 hrs.	7 wounds; 4 of mesentery.	Suture.	Died in 3 days.	Morton.

Wounds of Large Intestine after Fourteen Hours.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	D. M. Prince,	5 days.	2 of colon.	Suture.	Died in 48 hours.	Pers. letter.
2	Mackeller,	30 hrs.	2 of sigmoid flex.	Ligated.	Died in a few hrs.	Morton.

Wounds of Spleen and Colon.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	Cartledge,	2 hours.	Spleen and non-perforation of colon.	Spleen packed; colon sutured.	Recov.	

Wounds of Stomach and Spleen.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	O. Hage,	7 hours.	2 of stomach; spleen.	Stomach sutured; spleen cauteri'd.	Died.	

Wounds of Small and Important Vessels.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	F. S. Dennis,	?	7 of small vessels; 1 of mesentery; iliac vein.	Suture.	Died.	
2	J. H. Packard,	2 hrs.	Wounds of small ext. iliac vein.	Resected.	Died.	
3	F. W. Parham,	2 hrs.	Small and ext. iliac art.	.....	Died.	

Wounds of Stomach and Large Intestine.

No.	Operator.	Time.	Wounds.	Treatment.	Result.	Reference. Remarks.
1	T. G. Morton,	1½ hrs.	4 of stomach; 1 trans. colon.	Suture.	Died in 6 hrs.	Morton's table.

DISCUSSION.

Dr. James McFadden Gaston, of Atlanta, Ga.—Mr. President: This is a subject in which I take a great deal of interest, and yet I have not been able from my experience or reading to corroborate the very favorable percentage that the reader of the paper gave us in gunshot-wounds of the abdomen. I think, if I recollect rightly, I read in Ashhurst's collection of statistics some years ago that, instead of 75 per cent. escaping, he put it down that about 70 per cent. died whether operated upon or not; and it strikes me that the doctor in the report of his own cases gave a record in the neighborhood of 75 per cent. fatality, instead of 75 per cent. escaping. Gunshot-wounds of the abdomen which involve the intestinal canal are very serious; but the fact that the bullet has entered the abdominal cavity, if it has not wounded the intestinal tract, is not necessarily a very serious matter, although wounding of the mesentery and causing hemorrhage are sufficient reasons for exploration. I think the result of the work of all authorities in connection with this subject is that where we have evidence that the intestinal canal has been wounded an attempt at restoration should be immediately made, and that is the only salvation in the case, because if the fecal matter escapes into the peritoneal cavity and is allowed to remain there for hours or some days, we have serious consequences as a result. We all know and are familiar with the tests resorted to for the purpose of solving the question of perforation of the bowel. Of course, if fecal matter exudes from the external opening it is unmistakable evidence. Dr. Senn, as you are all aware, some years ago proposed the test of hydrogen gas by injecting the gas through the rectum into the alimentary canal and putting a small glass tube into the external opening with a little jet at the end of it. If the gas escaped into the abdominal cavity, it would find its way out from the tube, and by igniting it he had evidence that the bowel was perforated. I saw a graphic illustration of this principle by Dr. Senn himself at a meeting of the American Medical Association held in Cincinnati, and it impressed the American profession, as it did physicians probably in other parts of the world, at the time, but it has turned out that these forcible injections

of hydrogen gas or even simply air may be attended with risk, and I doubt to-day whether this idea of Dr. Senn is practised by very many surgeons as a test. There are more simple modes by which we can ordinarily get some idea as to whether there is fecal matter in the abdominal cavity, and a plan I proposed in an article read before the American Medical Association some years ago was to place two tubes side by side in the external opening in the abdomen, throwing fluid into one by means of a syringe and allowing it to escape by the other, as salt water, and you will get the evidence of the presence of feces escaping along this fluid if there is any considerable quantity of it in the abdominal cavity. We may have wounds, not only of the intestines, that are serious and warrant operation, but also of the stomach or other viscera in the abdominal cavity. The liver is an organ that is very often wounded and is attended with serious consequences. I recollect an interesting case which terminated fatally, and I had occasion to make a post-mortem examination. The man was wounded in the chest, the ball ranged downward through the liver into the abdominal cavity, and the track of this ball through the chest set up empyema. He had suppuration of the thoracic cavity, and died in consequence of it, without an operation, although, in opposition to the advice of my colleague, I was in favor of opening up the cavity and discharging the pus. At the post-mortem it was found that the ball had passed through the liver and was found suspended in the omentum without producing any serious trouble in the abdominal cavity. Balls simply by entering the abdominal cavity are not necessarily serious. There must have been hemorrhage from the liver at this time, and yet nature had provided for its reabsorption, and there was not a trace of any abnormal condition at the point where the ball passed through the liver except the sign of the cicatrix. The man lived two months from the time of the infliction of the injury.

The bladder is sometimes wounded by gunshot-wounds, and I recall something a little peculiar in reference to wounds of the bladder. I remember to have encountered a wound of this kind. The ball passed directly through from side to side of the bladder. The man had been drinking beer, his abdomen was very much distended, and he had occasion to urinate soon afterward. As soon as my attention was called to the case I hoped, by the con-

tractility of the viscus, that these apertures would be closed. I kept up constant drainage through the urethra, and the man got well without a bad symptom.

I am very positive in my conviction of the propriety of resorting to laparotomy after gunshot-wounds of the abdomen, and the sooner the better. I do not think operative interference should ever be delayed, and I believe it is the delay in these cases that makes death result from injuries of this kind. I think it would be well to have it go out from this Association that it is the voice of this body to encourage operators to open the abdomen and ascertain the points of injury, with a view to repairing them as soon as possible.

Dr. N. P. Dandridge, of Cincinnati, Ohio.—Dr. Parker has done very well in emphasizing the necessity for a short operation in these cases, and I am perfectly satisfied that when we can approximate the celerity with which the abdominal operation is done by gynecologists in gunshot-wounds we will save many more patients than we do at present. An early and quick operation is a matter of great importance, and this sometimes involves a good deal of responsibility on the part of the surgeon. The surroundings are not always of the best, and yet to have a patient carried to a hospital and allow him to lie there for several hours lessens the prospects of recovery very materially. Each individual case will have to be judged by itself, and the necessity for immediate operation will have to be decided by the surgeon at the time. There should be a very decided distinction made between penetrating gunshot-wounds and penetrating stab-wounds of the abdomen. The latter are very much less dangerous. In fact, a very large proportion of those cases, where it seems as though the intestines must be necessarily wounded, get well without operation, so that in penetrating stab-wounds we can be more conservative and watch the case before making an exploration. In gunshot-wounds an exploration should be made in every case where we have reasonable grounds for belief that the abdominal cavity has been entered. Gunshot-wounds are much more serious than stab-wounds. At the same time there are quite a large number of wounds upon the side of the abdomen in which there is reasonable prospect that the wound has not penetrated the intestine. These cases are always embarrassing and involve a great deal of responsibility.

Whenever we are in doubt I think it is a wise plan to open the abdomen, explore the wound, and determine definitely whether the intestines are wounded or not.

I can hardly agree with the essayist as to the percentage of recoveries likely to take place. Seventy-five per cent. seems to be a large proportion, and his own series of cases are certainly most gratifying and brilliant. Personally, I have never succeeded in saving a patient with gunshot-wound of the intestine. I have saved one case of stab-wound where the intestine was perforated in six different places.

Dr. Gaston spoke about feces in the cavity of the abdomen. It is an exception, and even where perforation has taken place in several places, we do not frequently find feces in the abdomen. Where the bladder and rectum are involved the escape of urine by the rectum is a very important symptom, and we will get the odor of urine without the patient having voided urine. I think this is always a symptom which should be considered as almost certainly indicating that the rectum has been perforated as well as the bladder.

Dr. A. M. Cartledge, of Louisville, Ky.—I believe the paper to which we have listened will be accepted by the members of the Association as representative of the status of the question of both penetrating and gunshot-wounds of the abdomen. I think it represents the best practice, and certainly, so far as I know, these are the best statistics that have been presented. We have six recoveries out of thirteen cases. These are the best results I have seen mentioned anywhere. Dr. Parker should be congratulated upon securing such results in penetrating wounds involving the intestines. Nearly all of the points have been brought out in the paper, but there are one or two things that I think deserve special emphasis. We speak of shock. I remember when I first commenced to operate upon penetrating wounds of the abdomen, that when we attempted to decide whether the wound had been a penetrating one or not, we did so by the depth of the shock, and that if there was no shock we decided to wait. If, however, there was shock we generally opened the abdomen.

It seems to me, and my experience impresses it strongly on my mind, that the most dangerous feature of penetrating shot-wounds is the question of hemorrhage. So this rules out all

methods of determining whether the intestinal tube has been wounded or not. If we get any foreign body in the posterior region of the abdomen, it will sooner or later produce almost a fatal hemorrhage if left alone, and my experience leads me to believe that the condition of shock so frequently spoken of as occurring in these cases is due to hemorrhage. A case of penetrating gunshot-wound of the abdomen may have numerous perforations of the intestines, and if the patient is so fortunate as not to have a bloodvessel of considerable size wounded he may walk four or five squares, tell you that he was shot, and does not think his case serious at all; but these are the cases that are fatal. If we find a man in the condition that we are accustomed to call shock, he is apt to die unless operated on at once. It seems impossible to separate positively in the mind of the profession the difference between acute anæmia and shock, but this distinction is not corrected in our text-books from year to year. The condition of so-called shock is an acute anæmia in most cases, and it seems to me it will forever in a measure prevent us from getting such good results, as a rule, as indicated in the paper. The essayist has been very fortunate in getting cases that have not been particularly characterized by hemorrhage, although mention was made of such cases. I have operated on five cases of gunshot-wound of the abdomen involving the intestines; three of them were hopeless cases, on account of hemorrhage from the beginning, one dying an hour and a half after a short operation, from the enormous amount of blood lost from a wound in a mesenteric vessel. The absence of shock-symptoms does not prove that the intestinal tube is not wounded. I said to Dr. Parker a short time ago that I had never saved a case of gunshot-wound with intestinal perforation.

In one case I had, not a great while ago, there were six perforations of the jejunum. The patient was a strong, vigorous man. I saw him an hour or two after he was shot. It was my fifth case of gunshot-wound of the abdomen with involvement of the intestines. The abdomen was opened, the six perforations were sutured, and I was satisfied that there were no more injuries to be repaired; yet this man developed septic peritonitis at the end of the second day, and died. He had been on a tremendous debauch; his stomach was greatly distended with limburger cheese and other things that he had eaten, and I believe

in this case the great distention of the stomach was a decided factor in bringing about peritonitis.

I think Dr. Parker's technique is splendid, with one exception. He says he thinks it is rarely necessary to drain these cases. As a rule, there is always an unknown quantity in every case of penetrating wounds of the abdomen. You are not certain that you have not overlooked something. I have no hesitancy in saying that I believe 80 per cent. of all operations for penetrating shot-wounds of the abdomen occur at night, because the class of people likely to be injured are shot at night. It is always an unknown quantity in every case, and you cannot be sure that you have not got an injury to deal with which will excite peritonitis; hence, I think the majority of such wounds should be drained.

Dr. A. V. L. Brokaw, of St. Louis, Mo.—I was very much interested in Dr. Parker's paper, and particularly in his statistics, because I believe they are the best we have at the present time. Out of thirteen cases he has had six successful ones. My statistics are not so good. In regard to gunshot-wounds, I believe we shall never reach the ideal; in other words, there is no treatment at our command which we can adopt that will particularly better the results in these cases. I regard every case of gunshot-wound as a law unto itself, and we have to meet every emergency as it arises. I am quite in accord with the doctor in regard to one point, that whatever we do we must do quickly. We must not allow our patients to die on the table, but must open the abdomen and complete the operation as quickly as possible, overlooking all niceties of minor detail. Of course, our hospital statistics are the best. We can never expect to have statistics from outside practice equal to hospital statistics.

The first experience I had in abdominal surgery was in a case of gunshot-wound of the abdomen. In certain parts of our State people are expert with the use of knives and pistols, and I believe we have our share of the wounds inflicted by these instruments. We find that in every case of penetrating gunshot-wound of the abdomen the best thing to do is to open the abdomen and seek out perforations. We make it a rule in all cases sent to the hospital to make an exploratory incision and repair the wounds, if any, as best we can. In order to improve our statistics we have got to operate quickly.

With reference to the use of Senn's gas-test for detecting perforations of the bowel, to my mind it is a dangerous waste of time to resort to it. It is much better to cut down at once to find the perforations.

I am in perfect accord with one statement made by Dr. Cartledge in reference to the modern bullet. The one that is in use at present is a smooth bullet with almost no cutting surface. In this respect it is not rough like the old bullet that would tear in penetrating almost everything. Some of the recent bullets cut like a knife, and there is a greater amount of hemorrhage following.

Dr. W. E. B. Davis, of Birmingham, Ala.—I wish to congratulate Dr. Parker on his excellent results. He has had an opportunity of seeing more cases of gunshot-wounds of the abdomen than, perhaps, any other member present. I speak not only of the cases upon which he has operated, but of those operated on by others and which he had charge of afterward. The point I want to emphasize is the importance of early operation and the almost hopeless condition for the patient if we operate after twenty-four or forty-eight hours. At the Charleston meeting of this Association I was criticised for the position that I took in regard to these cases. I contended at that time that at the end of twenty-four or forty-eight hours we would have a general peritonitis after a gunshot-wound with perforation, and that if we had this condition to contend with, an operation would offer but little hope of recovery. Yet there were members present who reported a number of cases of recovery in which there was said to be a general suppurative peritonitis. It is exceptional, indeed, that we find pus in the abdomen following a gunshot-wound of the intestine, for the reason that death takes place before the peritonitis has had time to go through the stages necessary to result in pus-formation, and I believe I am sustained in that position by Dr. Parker in his paper. I do not say that we cannot save some of the cases after twenty-four or forty-eight hours. We may have a small extravasation from the intestines into the general cavity, and that will bring about a correspondingly limited peritonitis. In such cases we may hope for recovery even after twenty-four or forty-eight hours.

Hemorrhage plays an important part in the mortality record. Perforation of the intestine does not occur so frequently in cases of abdominal wounds from bullets as we have been taught

to believe. Hemorrhage is a frequent cause of death, and in nearly all of those cases where the pulse is rapid and shock extreme soon after the injury, hemorrhage is the cause of it; and when we have perforation of the intestine, with hemorrhage, the operation is attended with a large mortality, the patient having been reduced by the bleeding. I think, too, that many of the cases of most severe injury of the intestine are attended by few symptoms. The patient will feel as if no injury scarcely had been sustained, and if we wait for the development of symptoms in such cases to operate, we wait for death, for we wait for peritonitis, and when general peritonitis has been established death follows.

The gas-test of Dr. Senn should not be used, inasmuch as it does not always find the injury or perforation, and it puts the patient in a worse condition for recovery after its use. It has done harm in its influence upon the profession and in shaping public sentiment with reference to operation. The views advocated by Dr. Senn have done much harm in that they have been the means of causing surgeons throughout the country to hesitate in operating in injuries of the abdomen for fear they might not find perforation of the intestine.

Dr. R. B. Rhett, of Charleston, S. C.—I happen to have had three cases of gunshot-wounds of the abdomen during the past year. Two of the cases were almost hopeless from the time I saw them. One was a little boy who had gone across the river a distance of some ten miles from the city to shoot with a rifle, and by some accident, they could not tell how, the rifle went off and the bullet penetrated from side to side just above the ileum. I suppose it was at least six or eight hours after the injury that he walked for some distance, and after he rode across the river he wanted to walk home, but some gentleman who saw that the injury was serious made him wait until he could be carried home in a carriage. I was away from my office at the time, and did not see the case for an hour or two afterward. The boy was taken to the infirmary. I do not recall the number of perforations, but the intestine was cut and had to be resected. There were a number of perforations besides. The ball struck the intestine in one place, dipping up and down, cutting it longitudinally. The hemorrhage was considerable, and the boy died within three hours after the operation.

The next case was a man who, in a struggle with a watchman, was shot in the posterior wall of the abdomen. A good many hours elapsed before he was seen by a physician. He lived ten miles from the city. He died in ten hours after the operation for closure of the perforations.

A third case was a negro boy, who was brought to the hospital at eleven o'clock at night. I was summoned and got there shortly after his arrival. The abdomen was opened and six perforations closed. Finding that the intestines were distended with fecal matter, I made an incision about two inches in length through the sound part of the intestine and emptied the bowel of quite a large quantity of fecal matter. The opening was washed with bichloride solution and subsequently with sterile water, after which the opening was closed. His bowels were opened the next day. I mention that on account of the point Dr. Parker makes as to the best time of emptying the bowels in these cases. The next morning, when the nurse's back was turned, he got out of bed and walked to the water-closet, a distance of forty feet or more; the nurse found him and put him back to bed. He made a rapid recovery without a single untoward symptom.

Although the title of the doctor's paper was on gunshot-wounds of the intestines, I believe he mentioned incidentally the treatment of injuries to the liver. I happened to have a case in the hospital of that character. A man was shot and presented evidences of considerable shock. I enlarged the wound in the abdominal wall, which was at the border of the costal cartilage, and found a great deal of blood in the abdominal cavity. It was with great difficulty that I could find injury of the liver. I did not know where it was at first. Being unable to find any injury in the intestines or adjoining structures, I pulled down the liver with some difficulty and found that the weapon had penetrated through the whole distance of the liver down to the peritoneum, but had not passed the peritoneum on the posterior surface of the liver. There was a large clot of blood, and it seemed to have stopped itself from oozing. I made a transverse cut through the skin and other structures, and then resected the rib right over the seat of injury. The injury to the liver was packed with iodoform-gauze, which was brought out of the wound, and he made an uneventful recovery. There are

one or two points in connection with these cases upon which I would like some information from those who have had a more extensive experience, and particularly from Dr. Parker. I was in doubt as to whether it were wiser in one or two of these cases to make an incision through the median line or just simply enlarge the opening. I would like to know the course Dr. Parker pursues in that particular. The only case that I succeeded in saving was the one in which the intestines were injured and the bowels moved on the following day. I considered it wise to move the bowels early, because I knew there was a great deal of fecal matter in the intestines, and I thought my sutures would hold better at an early date than to wait until they were possibly cutting and producing tension on the intestines.

Dr. Cartledge called attention to one point which I think is very important—namely, to carefully search for injuries. In one of my cases, although I was extremely careful, one of the perforations escaped detection. I do not remember the exact number of perforations at this time, but they are on record. My successful case was saved without drainage.

Dr. Dandridge spoke of there being a little fecal matter coming away from these injuries. In handling the intestines and searching for the perforations a little fecal matter escaped from the opening as I ran my hand along the intestines, but it is difficult to tell whether there is much fecal matter within the abdominal cavity or not, for the reason that in most cases there is a great deal of blood mixed with it.

Dr. H. M. Hunter, Union Springs, Ala.—My experience has been limited in regard to gunshot-wounds of the abdomen, but I am in a position to emphasize the importance of early operation if it is done at all. I am doubtful of favorable results operated on after twelve hours, however expert the surgeon may be in operating upon these cases. I recollect to have operated on a man who was shot, and the ball penetrated the colon, the ileum having been just touched. The operation was done thirty-six hours after the receipt of the injury. When I opened the abdomen I discovered a general peritonitis. There were two openings through the colon. The man died three or four hours after the operation from general peritonitis. On the other hand, I had the fortune to see a man who was shot with a 32 bullet, in which blood was passed with the stools. He refused to be

operated upon. There was every symptom of localized peritonitis, and in spite of this the man went on and eventually recovered without any operation.

Dr. John D. S. Davis, of Birmingham, Ala.—I am prepared to agree with the essayist in his conclusions. I think possibly some of the members misunderstood him in his allusion to the 75 per cent. of successful cases. I think he said 75 per cent. of injuries of the *small* intestine. I do not believe that in private practice or elsewhere *out of New Orleans* we would be able to get 75 per cent. recoveries from early operations where we have perforation of the *small* intestine. We must remember that in New Orleans they have wonderful facilities for getting these patients to the operating-table early. All of the cases the Doctor saved were operated on within or not more than two hours after the injury, and this is the key of success.

I am not inclined to agree entirely with the statement of Dr. Hunter that none of these cases can be saved after twelve hours, or that the majority of them will die if not operated upon within twelve hours. Some perforations of the small intestine are protected by a fold of bowel or by an exudate, so that the contents of the intestine will not escape for two or three days. If you have only a small amount of feces in the intestinal canal, there may be protection by the fold of bowel, so that you may operate in two or three days and save the patient. However, that is very rare. If we expect to save these patients, we must operate very early.

As to the symptoms in these cases. The most serious injuries that we have of the bowel from gunshot-wounds are often followed by no immediate bad symptoms. We may have several perforations of the bowel without the manifestation of any symptom. A man with ten or fifteen intestinal perforations may walk two or three miles after he has been shot, and in one case I had the man wanted to eat potatoes.

The cases that die quickly are usually those in which we have hemorrhage. If we do not have hemorrhage, they may live six or seven days. When we have the manifestations of severe symptoms in the early history of these cases they are seldom attributable to shock, but to hemorrhage.

As to the value of the Senn test, my brother has emphasized the danger regarding its use in detecting intestinal perforations.

I have condemned it on several occasions as a dangerous procedure.

As to the value of irrigation, suggested by Dr. Gaston, it is even worse than the Senn test, and I do not think Dr. Gaston would rely on it for the detection of wounds of the bowel, because the wounds are of such a character that there will be no escape of feces in many severe cases.

In closing the abdominal wound I agree with the essayist that we should not lose any time. I think the suture suggested by Dr. Price is an admirable one, and the one used by Dr. Parker enables us to close the wound quickly and safely, and answers as well as any other suture.

Dr. W. F. McRae, of Atlanta, Ga.—I have seen and known of several cases of penetrating wounds of the abdomen, and everyone I have seen in Atlanta has died, with one exception. A number of them were operated on; others were not. The exceptional case was operated on by the late Dr. Armstrong. There were numerous perforations of the bowel, and he resected a foot and a half of the small intestine. I have some hesitation in opening the abdomen where there is apt to be some medico-legal complication.

Dr. Gaston.—Was the Murphy button used in that case?

Dr. McRae.—The bowel was resected and end-to-end approximation made with the Murphy button. I have had one unpleasant experience with a case of stab-wound of the abdomen, the man dying shortly after the operation, and while that one fatal case should not weigh very strongly against operative interference, still it is a feature to be considered; and while I have felt a clean conscience in my case it made me feel decidedly uncomfortable.

Dr. Howard A. Kelly, of Baltimore, Md.—Would it not be well, Mr. President, in view of the serious medico-legal complications that arise in these cases, to pass a resolution favoring immediate operative interference whenever any of us come in contact with these cases? I therefore offer the following:

Resolved, That it is the sense of the members of the Southern Surgical and Gynecological Association that in gunshot-wounds penetrating the abdominal cavity the proper routine procedure is to make an immediate exploratory incision.

Seconded and carried.

Dr. Parker (closing).—I thank the members for their full and free discussion of my paper. I wish to say a few words in reply to the remarks of some of the gentlemen who have taken part in the discussion. I will first reply to Dr. Gaston's remarks. He speaks of the statistics given by Ashhurst. These are absolutely valueless. There are no statistics showing the value of operations in these cases that amount to anything, because, so far as I know, nobody has made a collection of any great number of cases. The largest number of cases I know of were collected by Dr. David Barrow, of Lexington, Ky., and they show a percentage of recoveries of about 38 per cent. Dr. Miles, in his first series of cases, reported thirteen cases with a percentage of recovery approximating 40. Dr. Gaston speaks of the great mortality. These cases were not selected ones at all. They were early and late cases. In one case, in addition to there being a wound of the liver, of the stomach, and of the intestine, there was a complication of gunshot-wound of the lung. Taking these cases as a whole, the percentage of recoveries is certainly better than the statistics the Doctor has quoted. Dr. Miles had in the neighborhood of twenty additional cases before his death, in which the percentage of recoveries was very much better in that series than in the first. The more familiar a man becomes with every class of abdominal work, the more quickly he learns to operate.

While I am inclined to agree with some of the objections that have been raised, there are one or two points that seem to be very important as bearing upon the gas-test of Dr. Senn. One of them is that it necessitates a certain amount of delay. Very few of us are prepared to resort to the gas-test just as soon as we are called to the case. The second point is that when the intestines are full of gas it makes it more difficult to put them back into the cavity after we are through suturing the perforations. By enlarging the wound and going down to the peritoneum, or passing a probe in it, is much better.

Dr. Dandridge spoke of perforations and of there not being much fecal matter in the cavity in some of these cases. In a case of wound of the intestine I am inclined to agree with him thoroughly that there is very little escape of fecal matter into the cavity; but in cases of wounds of the stomach, where the patient may have been drinking beer or something else, and his

stomach is full of a lot of stuff, we do get an escape of feces into the abdominal cavity.

In speaking of the percentage of recoveries, I will admit that at the Charity Hospital in New Orleans we do have special advantages. They have the best ambulance service that is to be found anywhere. Cases of gunshot-wounds occurring inside the city are brought to the hospital within a short time. When I made the statement that I believed in selected cases we could have 75 per cent. of recoveries in experienced hands if operated upon early, I do not believe that I overestimated it. Possibly, not a few of you have to operate in private houses, where the conditions are unfavorable; but I believe that in a well-regulated sanitarium or hospital, where we have simply wounds of the small intestine to deal with, we will have 75 per cent. of recoveries from men experienced in abdominal work.

With reference to hemorrhage, in some cases it is quite marked, and I quite agree with Drs. Davis and Cartledge that it is one of the dangerous features, and I tried to dwell especially on the fact in my paper that in cases manifesting symptoms of shock hemorrhage was associated with it. In my paper I stated that I used plenty of hot water in the cases that were operated on.

As to drainage, after you have stopped hemorrhage and have flushed out the cavity well, I do not believe that in recent cases drainage is necessary.

A few words as to late cases. I spoke of the unfavorable prognosis that we had to give in those cases, and yet some of them do get well. I suppose that I was one of the members that Dr. Davis alluded to as having differed with him at the Charleston meeting, and my recollection is that in the two cases I spoke of at the time there was a fibrinous peritonitis, but not suppurative. One of the cases occurred in the practice of Dr. Miles; it was operated on thirty hours after the receipt of the injury, and the patient recovered. In urging the importance of early operations in all of these cases I tried not to convey the idea that none of them would get well if they were not operated upon. In the last case thirty-six buckshot went into the lumbar region and twelve came out of the right iliac region. None of the physicians knew how many perforations there were, yet the man recovered without laparotomy. One case, during the first

year that I studied medicine, was shot a little above the umbilicus. He got well without laparotomy. Some six years afterward he came back to the hospital with another gunshot-wound of the abdomen. Dr. Miles operated and found the intestines matted together above the umbilicus, and the man got well from the second gunshot-wound.

Dr. Rhett referred to the position of the incision. Where it is possible I think the incision should be made in the middle line, for the reason that we can get a better view of everything in the abdomen; but where the wound is far to one side it is a good plan to make your incision over the seat of injury. Dr. Rhett also, in mentioning his case that recovered, spoke of two points. If it had been my case, I should have been afraid to pursue the course he did, and I must congratulate him on the result. He said it was very easy to incise the intestine and turn out the fecal matter. He told us that he washed it off with bichloride solution and then with boiled water. Personally, I should hesitate to use bichloride in the abdominal cavity. He spoke again of giving a purgative on the day after suturing the wound. I should be very much afraid to do this after having sutured wounds of the small intestine.

I congratulate him on his case of wound of the right lobe of the liver. The result was good. I believe Dr. Tiffany, of Baltimore, had a similar case.

Dr. Rhett.—I wish to say that it was the line of incision where the fecal matter came in contact with the intestine that was washed. The boy was laid over on the side and a pan was held under the intestine, the intestines being taken out of the cavity, then afterward washed off, first with bichloride and then with sterilized water.

Dr. Parker.—It would have been much safer to use sterilized water.

As to what Dr. Davis said about the prognosis in these cases and the medico-legal aspect of gunshot-wounds of the abdomen, it seems to me almost all surgeons to-day would advocate early opening of the abdomen in such cases, and if some brother practitioner should get into trouble as a result of it we should all stand together.

CONTRIBUTIONS TO THE PATHOLOGY OF ADHERENT PLACENTA, WITH CASES.

By Bedford Brown, M.D.,
Alexandria, Va.

Firm adhesion of the placenta to the walls of the uterus may occur at any stage of gestation. I have not infrequently seen cases in the early stages at the third and fourth months of pregnancy. Then, again, at the fifth and sixth months and at full term.

Etiology of Adherent Placenta. Unnatural adhesion of the placenta to the walls of the uterus must be regarded in the light of a true pathological process. This is eminently true of the condition when found in the last stage of pregnancy. In all the cases occurring in my practice at term or after the fourth month there were morbid conditions of system or traumatic causes existing to account for the causes of the complication. In those cases there was present positive rheumatic diathesis. In one there was present a decided gouty diathesis. In two cases the subjects had constitutional syphilis. Three of the cases could be accounted for by traumatism. In only two of the cases were there unknown causes.

Out of some two hundred cases of abortion seen in my professional practice in the early months of pregnancy some thirty of these cases were complicated with adherent placenta. In my own experience, in a very considerable proportion of the cases of abortion, the placenta has been adherent. I could not be mistaken in this condition, as the os uteri was amply dilated, and the placenta remained strongly attached

and had to be scraped away with the inserted fingers in detached portions from the seat of attachment.

Then, again, after abortion I found in certain cases the placenta weeks after the expulsion of the fœtus firmly attached, well preserved, with a communicating circulation with the uterus. Then, again, cases occur in abortion where the placenta is adherent, but dies from want of circulation, and remains in its attached state. After abortion, in cases of adherent placenta, if the organ is permitted to remain, if the placenta is connected with the uterus by a continuous circulation, it continues to live, and may give rise occasionally to hemorrhages, but never to sepsis.

On the contrary, when the adherent placenta dies and remains in utero a long train of evil consequences arise, as repeated hemorrhages, sepsis, septicæmia, fever, local septic inflammations in the pelvis, as endometritis, pelvic peritonitis. I am convinced that adherent placenta will be found in a considerable proportion of the cases of abortion, many more than in the last stages.

In the cases of adherent placenta of syphilitic origin coming under my care, the abortion has taken place about the fifth month of gestation. In these cases the fœtus was dead. In the cases of adherent placenta arising from the rheumatic and gouty diathesis gestation went on to full term. In those arising from traumatism the miscarriage occurred some two or three weeks after the injury. In these cases the injury consisted of, in two cases, of severe blows on the abdomen. In another case a fall on the abdomen was sustained. In all of these cases, after the injury, there were pain and soreness over the location of the injuries sufficient to excite suspicion of local peritonitis, lasting for some days. The supposition was that inflammatory action was set up by the injuries in the retained tissues at the seat of placental attachment.

In the case of one of these females, she had completely adherent placenta in three consecutive labors, at intervals of about two years. This patient had a remarkable tendency to acute inflammatory rheumatism. During her pregnancies she

invariably had two or more attacks of acute articular rheumatism; but during the period of lactation was free from the attacks.

In these cases, whatever the primary or remote cause may be, the immediate cause of adhesion is probably inflammatory action resulting in fibrinous exudation and adhesion of the placenta to the walls of the uterus.

The character of the adhesions differs materially in different cases. In some it is exceedingly strong and firm. In others, the medium of adhesion is not difficult to overcome. I have found the firmest adhesions in the rheumatic cases. In all three of these cases the adhesions were so strong and firm that the placental tissue seemed to be a part of the uterine walls, and it was with the greatest difficulty that it could be removed, and then only by scraping with the finger-nails, disintegrating the placenta in detached pieces, and then scraping the uterine walls thoroughly. In some the placenta could be peeled off with the fingers *en masse.* This was particularly the case with the gouty and syphilitic cases. In the first rheumatic case there followed a terrific case of sepsis, septic inflammation, and septic fever, caused by a very small portion of dead placenta left in attachment unknowingly. In the two other cases of rheumatic adhesion there were septic fevers, but of a modified type. In the last case it only continued for a few days.

In all the cases there were slight septic manifestations, but easily controlled.

It is very remarkable what a small portion of dead animal tissue, undergoing the process of putrefaction, left in the uterus, will produce septic poisoning. I have seen a portion of putrid fetid placenta not larger than the end of the finger cause alarming sepsis. I have seen a portion of putrid membrane not larger than a silver dollar cause severe chill and high grade of septic fever. I have, again, seen a decomposing clot retained in the uterus give rise to decided symptoms of sepsis. This teaches us the important lesson that we can-

not be too careful in clearing the uterus of every particle of dead animal matter.

In my experience, the question of sepsis in cases of adherent placenta depends almost entirely on whether a portion is left adherent to the walls of the uterus. If even a small particle of placenta is left adherent and undergoes putrefaction, sepsis will surely follow. If the particle is very small, the septic fever may not be of virulent character, but there will be more or less septic fever. But even in the case of a fetid portion remaining in utero and producing sepsis this septicæmia may be greatly modified by the action of antiseptic intrauterine douches. A dead piece of placenta in utero, subjected to a temperature of 100°, is one of the most offensive, stinking, infectious portions of animal matter in my knowledge. I have known a portion of putrid placenta not larger than a marble, when expelled from the uterus, render a room horribly offensive.

These small particles, often left after the removal of the mop, which are sure to become a cause of trouble, can be disinfected, deodorized, and embalmed, so as to render them innocuous.

In all the cases followed by sepsis, in my practice, the attachment of the placenta was very firm and close, necessitating its removal by detached portions, after being broken up, when doubtless small particles were inadvertently left, though the walls of the uterus were carefully scraped with the finger-nails. In other cases, where the attachment was such that the entire organ *en masse* could be peeled off, there was no sepsis.

Method of Removing the Placenta. As a preliminary measure to the operation of removing an adherent placenta the hands and arms of the accoucheur should be thoroughly scrubbed with carbolic soap, and then bathed in a strong solution of sublimate.

The vagina should be well douched with sterilized water containing bichloride in solution. The patient is now laid across the bed in the lithotomy position and placed fully

under the influence of chloroform. The globe of the uterus is held down firmly by the hand of an assistant, while the operator inserts his hand up to the fundus of the uterus, and gradually but cautiously peels or scrapes off every particle of adherent placenta.

The operation of removing an adherent placenta is really a very important one, and its success depends on its being carried out in all its details. I performed this operation once without the aid of an anæsthetic, but will not attempt it again. It is far more safe for the patient, and far easier of accomplishment for the operator, and can be completed much quicker and more thoroughly, as we then have complete command of the situation. I prefer, in these cases, the natural curette—the fingers—to any other instrument, as the sense of touch is the very best guide and tells us what we are doing and what we should do in a manner that no metal instrument can.

If a chill and fever should occur within two or three days after this operation, we may know that we have left a small particle of dead placenta that has undergone putrefaction in the uterus and is proving a source of septic poisoning to the general system, and we must be prepared to promptly disinfect this poisonous mass, however small it may be, for it will often surprise us to know how small a portion of putrid placenta will infect a strong, healthy, robust woman in the vigor of womanhood, and will rob her of a valuable life. I am so much impressed with the importance of the operation of removing an adherent placenta, and its consequences to the preservation of the life of a mother, that I regard it of more importance than the amputation of a limb.

Case I.—Mrs. R., married, aged thirty-two years. Third child. Mrs. R. had an attack of inflammatory rheumatism in the early months of her pregnancy, which continued until very near her confinement, resulting in anchylosis of the knee-joint. The labor was natural. The placenta was found closely adherent to the uterus. The operation of removing the placenta was performed without the aid of an anæsthetic, and,

as the patient refused to take it, the removal was accomplished with great difficulty. The placenta had to be removed in detached portions, and finally, after all was supposed to be removed, the uterine wall was scraped with the finger-nails. This case occurred twenty-seven years ago, long before the modern treatment of these cases was thought of. At that time such a thing as a intrauterine douche was unheard of. And this case was the first one in which I had personal experience with a vaginal disinfectant douche in puerperal cases.

The hemorrhage during the operation was not alarming. The patient did very well until the third day, when a prolonged chill ushered in a violent fever. The pulse very soon reached 125, the temperature 105°, and the abdomen became tense and painful. Indeed, all the indications of general peritonitis set in.

For twelve or fifteen days the life of the patient was despaired of. During this time the pulse ranged at 130 or 135; the temperature from 105° to 106°. The tympanites was very great.

Treatment. Quinine in large doses; calomel and opium; turpentine stupes; saline laxatives and vaginal douches of hot water and carbolic acid.

About the fifteenth day a small portion of intensely offensive, putrid placenta was discharged. Its odor was perfectly nauseous. This particle of placenta did not exceed in size the end of the finger. From that time the pulse and temperature began to be lowered, the tympanites and abdominal pain to subside, and within four or five days my patient had passed the crisis and was beyond the danger-line.

Immediately after the attack of peritonitis developing symptoms of rheumatism promptly subsided.

Case II.—Mrs. R. This was the same woman whose history is related in Case I. Two years after the last labor she became pregnant again, and in due time gave birth to another child. During this pregnancy Mrs. R. had two severe attacks of inflammatory rheumatism, the last continuing up to the period of labor. In this case she again

had an adherent placenta, but not so firm as in the first. Under the influence of an anæsthetic I was very careful in removing every particle of placenta and in scraping the seat of its attachment. The patient had but slight fever and recovered without difficulty.

CASE III.—Mrs. R. In her third pregnancy Mrs. R. was much afflicted with articular rheumatism, and confidently predicted another case of adherent placenta, which was fully realized. After her labor, which was natural, the placenta was found adherent and very carefully removed under an anæsthetic. No fever followed in this case, and the patient did well.

One of the most remarkable features in this phenomenal case was that every child born with an adherent placenta was profoundly idiotic and died before reaching the sixth year. This woman gave birth to three children subsequent to this without the rheumatic features and without the adherent placenta, and all of these childern are well developed and with fair degrees of intelligence.

CASE IV.—Mrs. B., young married woman, second child; labor natural. The placenta was found attached moderately firm, but was peeled off and removed *en masse.* It was studded with numerous deposits as large as small pease throughout its tissues. This patient had suffered several attacks of gout of the toes and fingers. In the joints of the latter there were considerable deposits of urate of sodium. She had quite a sharp attack of gout during her pregnancy. This case did well and was not followed by any septic symptoms. I cannot for a moment doubt that this was a case of gouty placenta.

CASE V.—Mrs. S., a married woman, aged twenty years. Soon after marriage contracted syphilis from her husband. When examined first by myself I found a fully developed chancre on each labia, which had appeared about five weeks previously. Under treatment these chancres healed in two or three weeks. Some two or three months subsequent to this she became pregnant with her first child. At five months of

her pregnancy I was called to see this woman, then threatened with abortion. In due time the abortion took place, without the slightest discharge of blood. This is a common feature of labor wherein the placenta is completely adherent. In this case the umbilical cord was perfectly atrophied. It was exceedingly attenuated, soft, and easily torn.

The fœtus was emaciated and of a pale, sallow complexion. The placenta was found perfectly adherent in its entire circumference, and was in a diseased condition. The hand was disinfected, the vagina washed out with warm sublimate solution, the patient placed across the bed in the lithotomy position and given an anæsthetic, the hand inserted into the vagina and uterus without difficulty, and the diseased mass peeled off, leaving the wall of the uterus perfectly clean. I will state the fact here that, when necessary, the entire hand can be inserted in the uterus at five months of pregnancy without the least difficulty when the patient is fully under the influence of chloroform. Mrs. S. recovered without any untoward symptom. I will also state here that during her pregnancy she had well-marked symptoms of secondary syphilis in the form of ulcerated throat and syphilitic eruption, and that she was treated for these symptoms.

After confinement she was subjected to a rigid system of treatment for syphilis, with entire recovery. She subsequently gave birth to a healthy child without any untoward symptoms.

Case VI.—Mrs. K., young married woman, with first child. Labor natural. On examination of placenta attached to one edge of the organ there was found a distinct pedicle about one inch and a quarter in length, which had a torn end and evidently had been separated from an attachment to some point beyond the placenta. I thought it best to explore the uterine cavity to ascertain whether anything remained. The patient was chloroformed and a careful exploration made, with the result that a perfect cotyledon of the placenta measuring one and a half inches in diameter was found completely adherent to the uterus, but was peeled

off and removed intact. The corresponding end of the pedicle was found attached to the cotyledon. Slight hemorrhage followed the removal, but no other trouble.

I have reason to believe that while these cotyledons are not frequent complications they are more frequent than is usually supposed, and that when left in the uterus will give rise to most serious consequences in the form of puerperal sepsis.

CASE VII.—Mrs. B. During her pregnancy with her third child sustained a severe fall from a height of some distance, falling in a manner to strike the abdomen about midway on the back of a heavy chair with great force. She suffered intense pain in the region of the injury. For many days she was confined to her bed with pain and extreme tenderness over this region, accompanied with fever. At the time I apprehended general peritonitis, but the symptoms ultimately subsided without serious consequences. This accident occurred at the sixth month of pregnancy. In due time Mrs. B. was delivered, after a natural labor, of an ill-developed, small, and delicate child. The placenta was found perfectly adherent to the wall of the uterus precisely corresponding to the seat of the injury. The adherent organ was removed in the usual way, under chloroform, and subsequently the patient did well. All the indications in this case point to it as a very good example of adherent placenta from traumatic causes.

Treatment of Adherent Placenta during the Early Months of Pregnancy after Abortion. After a large experience in the management of accidental abortions, amounting to some two hundred cases, in a considerable proportion of which the placenta was adherent, I have come to the conclusion that the best and safest method of removing it was to place the patient across the bed in the lithotomy position, disinfect the vagina and the physician's hand, put her under chloroform, insert the entire hand in the vagina, then the fore- and second fingers of the left hand in the uterus, and, using the fingers as a curette, remove every particle of placenta;

then wash the uterus out with a solution containing permanganate of potassium, two grains to the ounce. I believe this to be a better, safer, and easier method than that by the steel curette, and one by which no damage can be done to the walls of the uterus.

I desire, in conclusion, to say a word relative to the use of ergot in cases of adherent placenta, whether in the earlier months of pregnancy, after abortion, or at term. It can accomplish no good whatever, and is capable of doing much harm by producing a rigid contraction of the uterus and particularly of the os uteri, in this way delaying expulsion and preventing the introduction of the fingers or hand.

MATERNAL IMPRESSIONS AND THEIR INFLUENCE UPON THE FŒTUS IN UTERO.

By Claudius Henry Mastin, M.D.,
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It is a well-established conclusion, one having the full and entire indorsement of scientists, that all animal monstrosities do not arise in the original organization of the embryo, but from subsequent accidents occurring after conception, and during the term of utero-gestation.

An evidence of this fact is illustrated by those preternatural appearances of, or rather upon, the fœtus, which now and then arise from frights, or the so-called "longings" of pregnant females, constituting what are known as "nævi materni, or "mothers' marks," the sequences of maternal impressions.

I am well aware that diverse and opposite opinions are entertained upon this subject, and that a large amount of scientific and well-digested literature, based upon correct physiological grounds, bearing upon the subject of conception and gestation, has been produced to controvert such ideas; whilst, on the other hand, much has been produced which goes to sustain the popular belief in vogue among the laity, old women, and not a few of the best-informed in our own profession. Many well-recorded cases have fallen under the observation of gentlemen in the profession who are not given to hasty or immature conclusions, but gentlemen who, after careful analysis of the cases which have come under their immediate notice, have been compelled to give their unqualified indorsement to the truth of this assertion.

The simple fact that these "mothers' marks" are not seen

upon *every* child which is born, although we know that during the nine months of utero-gestation almost every single expectant mother, at one time or another during her pregnant terms, passes through stages of mental excitement, or undergoes cravings and longings which are usual in her condition, without the means or power of gratifying her appetites or pleasing her fancies, and still there may be no stain or blemish upon the face or the form of her infant after birth.

Even though this be true, it is no argument against the fact that maternal impressions, under certain conditions and at certain stages of pregnancy, may and do occur as the direct result of *powerful or prolonged disturbance of the nervous system.*

We know from our personal observations that *every* child which is born into the world is *not* stamped with the trademark of its mother's fancy, or the evidence of her alarm and terror. But because this is true, in many instances, we cannot accept it as an invariable rule, and thus deny the truth of the aphorism of Chelius: "The probable is not always, the improbable is occasionally true."

We are aware that many, very many pregnant women are alarmed without consequences, and the most fantastic phantasies may cross their idle brains without any such results. It is an axiom, as true as it is forceful, that "When a circumstance may proceed from many causes we do not universally reject any one, because it is frequently alleged without reason;" and so it is, there are too many well-authenticated cases before us to justify us in doubting the strong effect of maternal impressions. Just here I must acknowledge that for years past I have been a pronounced skeptic on this subject, so much so that I was unwilling to accept even the evidence of the sacred writer who recorded in the book of Genesis the following:

"And Jacob took him rods of green poplar, and of the hazel and chestnut tree; and pilled white *stakes* in them, and made the white appear which was in the rods. And he set the rods which he had piled before the flocks in the gutter in the water-

ing-troughs when the flocks came to drink, that they should conceive when they came to drink. And the flocks conceived before the rods, and brought forth cattle ring-straked, speckled, and spotted."

This very descriptive, though not very elegant passage taken from the Mosaic account will show the antiquity of the belief in the impressions made by external objects upon the impregnated ovum. So prevalent was this idea among the ancients, and especially so with the Spartans, that the good looks and other qualities of the child might be impressed or influenced by ideas or objects presented to the mother's mind, that it was an established custom to place beautiful pictures and other agreeable objects before their pregnant women, so that they might be constantly in their sight, and thus have an effect upon the unborn child. So common was this that, by a law of Lycurgus, it was ordered that the pregnant women of the empire should have constantly in view the images of Castor and Pollux, thus to insure the beauty and strength of the expected infant.

It is a widespread and popular belief that pregnant women are impressed by external objects, and, as a rule, the majority of popular ideas have foundation in fact; yet very many absurd notions and ridiculous stories arise from ignorance and superstition, and hence become general among the uneducated. This is evidenced by many superstitious people, who attribute a great deal to the supernatural, and very much more to the *sympathy* of people. Butler, in Hudibrastic lines, gives an amusing description of sympathy, and absurdly illustrates it in his description of the Taliacotian operation: "So learned Taliacotius, from the brawny part of porter's bum, cut supplemental noses, which would last as long as parent breech,

> "'But when the date of Nock was out,
> Off dropt the sympathetic snout.'"

The idea of *sympathy* has a powerful hold upon the popular mind; and a widespread notion prevails among horticulturists, which they assert is true, *i.e.*, "a graft will dry up and

drop off, if perchance the tree from which the graft was taken is cut down, or otherwise should perish." Although this idea is not sustained by actual results, it is, nevertheless, believed to be true. Another rather curious and strange fact, or, we might more correctly say, coincidence, is that wine which has been kept in wooden vessels will, at certain seasons of the year, almost always set up a feeble fermentation, and, as a rule, about the same time of the year when the vine commences to blossom. A rational solution would be, the vine begins to blossom when the warm weather sets in, and the fermentation in the wine-cask is doubtless due to change of temperature, and the setting free of gas which had been fixed by the cold weather of winter.

If, however, there be a sympathy exerting an influence upon organic bodies, whether animal or vegetable, a something intangible, which we denominate *a sympathy*, then how or why should we question the possible, nay, the probable, result of impressions made upon the most sensitive of all structures —the nervous system?

When I speak of coincidences I simply dodge the question, and I dodge it because I have no other more rational explanation to offer; and I am free to admit that it is as irrational as to pronounce a manifestation of a natural law "a miracle," because the finite mind has not been taught to comprehend the workings of the infinite.

When we see a child upon whose person there is a nævus bearing some resemblance to a fruit or a flower, which the mother tells us she had "longed for" during her pregnancy, we may doubt and be skeptical at her belief, yet we cannot deny that the phenomenon shows there does exist a wonderful sympathy between external objects and the uterine system of nerves—a sympathy born of a powerful impression made upon the mind of the woman, at a time when of all others she is most impressible.

The strangest part of the so-called superstition or popular belief is that the sympathetic impression remains even after the birth of the child, and is subsequently observed between

the marks and the objects they are said to represent. This is illustrated by the coincidence which seems to have a shade of authenticity, that when these marks bear a certain resemblance to fruits they assume a tinge of maturity when said fruits are ripening, and become gradually more pale when the fruits are going out of season. I have had my attention directed to this point, and have seen persons whose marks evidently were more colored at one season of the year than they were at others. But I solaced myself with the belief that this change was most probably due to a systemic condition of the individual at that particular season of the year.

It is not at all strange that with the existing belief in the popular mind we should see marks of almost every conceivable description depicted upon the skin of children. I myself have seen what the mothers have told me were "dried peaches," "strawberries," "raspberries," "port-wine stains," and a variety of other objects. The most notable of which was a little negro boy, about eight years of age, whom I saw a year ago. This little fellow was the subject of a most horrible deformity of the face, which gave him more the appearance of a wild beast than a human being—his countenance was distorted by a roll of rough skin which increased his facial angle, making him prognathous in the extreme; it was covered with coarse, rough hair, and he was unlike anything else than a lower animal. As I examined him and wondered at the mysterious ways of Providence, I was forcibly reminded of the lines written by an old poet of the long ago, one not much read nowadays—Peter Pindar—who described a person whom he had seen: "A pair of leathern cheeks composed his face, from which there sprang many a hairy sprig—resembling much the bristles on a pig." This similarity was sustained by the mother of the boy, who assured me that it was a birth-mark, and had been produced by her intense desire, when pregnant, for roast pig. I was skeptical on this point, and doubted the possibility of one of the freedmen of the present day, longing for pigmeat, and not gratifying her desires!

Fright or sudden alarm has a powerful impression upon the pregnant female, and there are many instances in which premature delivery has taken place as the consequence of such shocks, showing the influence upon the general nervous system; whilst shock of less intensity may produce less serious effects upon the gravid uterus and its contents. In evidence, I may mention a case where a lady in the early stage of her pregnancy was very much shocked at the sight of some leeches upon the foot of a relative; her child was born at term with the mark of a leech coiled up in the act of suction upon the identical spot upon the foot of the child. Another lady gave birth to an infant whose mouth was filled with globular tumors growing from the tongue, tumors which bore a strong resemblance in shape to a bunch of grapes, both in color and in form. It was established that she had *craved* grapes during her pregnancy, which was at a season of the year when that fruit could not be obtained. During the same pregnancy she had also been very much alarmed by a turkey cock, and when the child was born, in addition to the globular tumors in its mouth, it had upon its breast a red excrescence exactly resembling, in figure and color, a turkey's wattles. This double mark may have been *a coincidence*, and, if these growths had been carefully examined, it is not at all improbable that the microscope would have revealed a case of multiple fibroma.

There are so many curious stories related of these mother's marks that it would consume too much of your time for me to go further into a detail of them, but it may serve a purpose if I, in conclusion, mention one or more which have been related by gentlemen of such known reputation for veracity that we cannot, with propriety, question the truth of the cases, even though we may doubt the causes. A French writer of eminence, whose name at this moment, without some research to find it, has escaped my memory (but I think it was Colmbat de'l'isere), mentions a case which was brought before a commission appointed to investigate and report upon it, and which was to the effect that a lady was

delivered of a child, upon the iris of whose eyes was clearly depicted the dial of a watch—not an imaginary or simple representation, but the figures clearly outlined. This is rather a hard story to credit, but since the case has the authentic indorsement of reliable professional gentlemen, we may content ourselves with placing it among other remarkable medical curiosities!

In the classic work of Prof. W. F. Montgomery, than which there is no other more authentic and reliable treatise upon pregnancy, we find some most curious and remarkable cases taken from his own practice; one or two of which I will quote in his own words, as substantiating the truth of maternal impressions. Dr. Montgomery says:

"A lady, pregnant for the first time, to whom I recommended frequent exercise in the open air, declined going out as often as was thought necessary, assigning as a reason that she was afraid of seeing a man whose appearance had greatly shocked and disgusted her. He used to crawl along the flagway on his hands and knees, with his feet turned up behind him, which latter were malformed and imperfect, appearing as if they had been cut off at the instep, and he exhibited them thus, and uncovered, in order to excite commiseration.

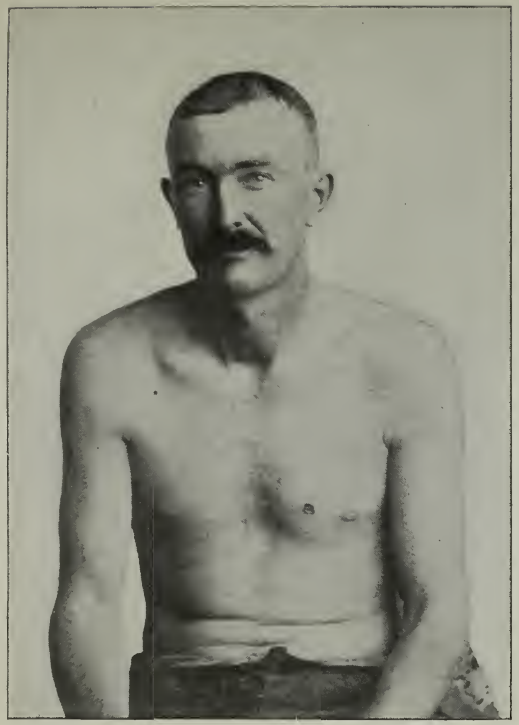
"I afterward attended this lady in her confinement, and her child, which was born a month before its time and lived, although perfect, in every other respect, had the feet malformed and defective, precisely in the same way as those of the cripple who had alarmed her, and whom I had often seen."

Another more remarkable case than this is given by Prof. Montgomery as having occurred in his own practice, and therefore not to be questioned. He says: "Mrs. N., the wife of a clergyman, came to Dublin for her confinement, and a lady who was with her told me that she had been very uneasy in her mind from an impression that her child would be born with a deformed hand. Her anxiety had been induced from the following occurrence: The mistress of a school which she frequently visited had been delivered of a child with a deformed hand; and as Mrs. N. was known to be at all times

very nervous and easily alarmed, and was then a short time pregnant, great pains were taken to prevent her seeing the child's hand. It so happened, however, one day that she walked unexpectedly into the room where the child lay asleep, and sat down by the cradle to look at the child, which at that moment happened to have the deformed hand fully exposed to view. She felt greatly shocked, and afterward alluded to what she had seen, and expressed her conviction that her child would be born with a similar deformity. I delivered her, and very soon after she was attended to she expressed an anxious wish to see the infant, which was brought to her wrapped up in a flannel in the usual way; she instantly drew out the child's arm and exclaimed, 'Oh, the dreadful hand,' and there it certainly was, with exactly the same deformity as that which had excited her disgust and terror several months before. The deformity (in each) consisted in the absence of one finger, and the complete union of the middle and third fingers, the united extremities of which were covered by one nail, and presented a very disagreeable appearance."

Can we doubt these statements at the hands of such a man as Prof. W. F. Montgomery?

Notwithstanding such evidences, we are constrained to feel that it is altogether inaccurate to attribute such consequences *entirely* to the influence of the mother's imagination, while they are in reality truly effects of physical causes of a very obvious kind, and in no way fairly ascribable to the power of imagination alone; but to whatever conclusions we may come as to the precise agency of such causes, it will be always safe and prudent to act upon the presumption that such consequences *may* follow certain causes, from exposure to which it should be our endeavor to save the pregnant woman; for, although we do not credit all the idle stories which we may hear, there certainly are cases wherein it seems to me to be very hard to depart totally and altogether from that opinion which is common to some of the greatest men. So, then, the question whether mental emotions do influence the development of the embryo must be answered in the affirmative, be-



cause instances undoubtedly have occurred where maternal impressions, such as violent shocks or fright, have given rise to malformations; and since many malformations originate in an arrest of development, it is frequently the case that they do bear a certain resemblance to various animals; so also it is conceivable that the development of the embryo may be so arrested by maternal emotions as *accidentally* to occasion a likeness between the object that produced the impression and the resulting malformation.

The question is yet a mooted one as to the kind or degree of impression required to modify the condition of the embryo, so as to develop a malformation; as it is to decide whether it be produced simply through the agency of the mind of the woman, or is the result of a direct shock to the nervous system itself.

These prefatory remarks will enable me to present a brief history of a case of very great interest, and, since it has occurred under my own immediate observation, I can vouch for its truth. I will narrate the facts and then present you the photographs:

William Y., aged thirty-two years, was shot on the morning of September 24, 1894. The ball, a 38-calibre, was fired from a Winchester rifle, and entered the rear of the chest on the left side, just below and to the outer side of the angle of the scapula; at this point it penetrated the chest between the seventh and eighth ribs; passing through the entire chest it emerged from the intercostal space between the fourth and fifth ribs, two and one-quarter inches from the left nipple on the inner side. The exact measurement of the man's chest shows the distance from the mid-sternal line in a transverse direction to the centre of the left nipple is four and one-quarter inches—a line drawn from the wound of entrance to that of exit passes directly through the location of the right ventricle, and it is upon this anatomic fact that I diagnosticated the case to be one of direct heart penetration.

I shall not consume the time of the Association with a detail of this case, which has been the subject of a paper

upon "Gunshot-wounds of the Heart," which was read before the American Surgical Association at its New York meeting in 1895, and published in Volume 13 of its *Transactions*.[1] At the time when this man was shot his wife was near by, and reached him very soon afterward. In attempting to render what assistance was in her power her hands were stained with blood, and she also had her face covered with gore. When I saw the case late that afternoon, I found her very much agitated, and seemingly as much exercised on account of her condition as she was for her husband's safety. She then informed me that she was pregnant, and felt certain that her child would be born with "a bloody face." I asked her why a "bloody face," and she said, "Because I put my bloody hands to my face and covered it with blood, and I know my child will be born with a bloody face." She was an ignorant countrywoman, and filled with superstitious notions. I calmed her fears as much as I possibly could, and dismissed the subject from my mind. After a long and tedious convalescence her husband was able to be taken to his home in the country, and I thought no more of the case, beyond the remarkable recovery from so severe a wound. In the succeeding spring of 1895 the man and his wife came to the city and called at my office, bringing with them a newborn babe. She said to me, "Doctor, my baby has not got a bloody face, but it has got the holes where the ball went through Bill's breast." Upon examination of the child I did not find "the holes" which she said were there, but in place of them I discovered the *bright red marks*, clearly shown upon the chest of the child; they were not simply discolored spots, but elevated nævi, and *bright carmine-colored spots*, easily to be seen at a distance of a hundred feet away. There they were, on the left side of its chest, and although not in the exact anatomical location of the wound on its father's chest, still so near the spot that they are easily recognized as resulting therefrom. The mother had seen the wounds in her

[1] Those interested in the subject of heart-wounds can consult the volume mentioned; the case is one of much interest, and rendered more so by the sequel!

husband's chest, and had told me during his illness that they made her sick every time she looked at them. Interested now in the condition of the case, I made accurate inquiries as to her pregnancy and the date of her delivery. She informed me that her pregnancy had passed as was usual in former ones, with the exception that she had been very nervous, and that the motions of the child had been more violent, and brought on by any noise or excitement. Her labor, which took place on May 10, 1895, was about as previous deliveries. Assuming the term of gestation to be 280 days, and this child having been born on May 10, 1895, it is fair to calculate that her conception took place about August 3, 1894, and from that date to September 24th, the date on which the father was shot, gives us fifty-two days. The question is, Was the maternal excitement at the sight of the wound in her husband's chest the cause of this mark upon the child, with which she was then pregnant? I present the facts and leave the Association to answer.

NOTE.—The photograph of the child was very difficult to get, owing to the fact that the child was from the country, unaccustomed to seeing anything, and on that account it was almost impossible to keep it still enough to get a likeness. Hence the spot does not show as clearly as it should. It was not possible to get a back view taken.

THE DRY METHOD IN INTRAUTERINE SURGERY.

By Edwin Walker, M.D.,
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Last year I read a paper before the Indiana State Medical Society on the abuse of water in surgery. Some of the disadvantages of its excessive use in both septic and aseptic cases were pointed out. It was urged also that outside of hospitals, where we have to rely on unskilled help to prepare the water, it is often used from vessels improperly cared for, and is often the source of infection. On the other hand, there is no longer a doubt that ideal asepsis may be attained by the dry method. The action of water, though it be pure and sterile, exercises an unfavorable influence on healthy tissues, while antiseptic solutions often injure them and markedly reduce their ability to resist infection. On the other hand, it is practically settled that septic wounds cannot be rendered aseptic by any washing or the use of antiseptics, no matter how strong they are used. In these cases all we can do is to render the conditions such as to give the tissue a chance to exclude the germs.

It is not intended to inveigh against water used to cleanse the parts before operation, for it is indispensable here, but after the operation is begun it should be dispensed with; nor is it denied that in some septic cases, as ulcers or abscess-cavities, it may be mechanically impossible to remove sloughs or other detritus without water. If efficient drainage is established, such cases will not be numerous.

In this paper I will discuss briefly the dry method in intrauterine work. I believe there has been a universal tendency in this direction; personally I have gradually used less irriga-

tion until I have almost given it up entirely, and my results have been much more satisfactory since doing so.

The most frequent occasion for invasion of the uterine cavity is to remove the products of conception and curettage for endometritis, and in these cases I have most extensively employed the dry method. It has been almost the universal custom in these cases to irrigate with plain water or some antiseptic solution. This is directed by all the standard works on gynecology. Irrigation is superfluous. After a thorough curettage for endometritis or the removal of the placenta we have a fresh wound, which is to be cleaned, and the blood wiped off, just like an incision. This can be more efficiently done by wiping with sterile gauze than in any other way. Besides, irrigation is often positively harmful. Who has not seen localized peritonitis after irrigation of the uterus by passage of fluid through the Fallopian tube? Besides, the water or antiseptic does in some degree impair the exposed tissues, and is often itself the carrier of infection. It is a rule that the simplest method, the one which requires the employment of the fewest things and the least handling, is the one which will most frequently attain asepsis. Water or fluids have to be poured from one vessel to another, and in many ways is exposed to contamination.

By the dry method these cases are very simple. In curettage for endometritis the patient is put in Simon's position and the vagina scrubbed with liquid soap. This is washed out with creolin, and this followed by plain water. It is then thoroughly dried with sterile cotton. Dilate and thoroughly curette as usual. When this is done the cavity is thoroughly wiped out with sterilized gauze. The wiping is repeated several times, until the gauze comes out but slightly tinged with blood; then it is wiped out once with iodoform-gauze and then packed with the same. I have found it a great help to have the gauze, both plain and iodoform, cut in suitable strips and packed into a glass tube (a large test-tube). It is sterilized in these tubes and drawn directly from them and placed into the uterus without touching anything but the

dressing-forceps. The tube is held by the nurse close to the vulva, and it is drawn out only as it is packed into the uterus. If the case is one of abortion, and part or all of the ovum is retained, the same method is followed, except that Martin's curettage forceps are used to facilitate the emptying of the organ. These are dull, smaller, and less clumsy than the ordinary placental forceps, and are much more convenient and efficient. The wiping and the packing are the same, except that it has to be more frequently done, the hemorrhage is more, and there are more shreds of tissue to be wiped out. I do not suppose by this process we really remove all of the membranes—I doubt if we ever do—but this is not necessary, for in aseptic treatment healing will be complete. If the os is patulous and the abortion is as late as the fourth or fifth month, the fingers may be introduced and will greatly aid in the removal of the placenta. I have, however, found the forceps a great aid in these advanced cases, and have never done any damage with them. I have in two instances emptied the uterus for vomiting in pregnancy. These cases had both advanced to about the eighth week. The vomiting was so severe and constant that after consultation it was decided that further delay would greatly endanger life. The os was dilated as usual, the ovum was seized with the forceps and stripped out, the membranes being extracted in pieces. The cavity was then curetted, wiped out, and packed. In neither case did the temperature rise above 99.6° nor the pulse above normal. In both cases the nausea ceased at once, and neither was even sick from the anæsthetic. It is interesting to note here that one patient became pregnant a few months later and was almost entirely free from nausea during her pregnancy. I have a number of times emptied the uterus in a similar manner before the fœtus was expelled, after finding the abortion was inevitable. The advantage is that the patient is spared much suffering and hemorrhage, and the danger is very much less than by waiting for nature to do the work.

I cannot leave this point of the subject without a note of

warning. It is understood that this method is free from danger only in the hands of those who have sufficient skill to do it properly and those who have learned, by careful study and experience, to do aseptic work. Unless these manipulations are done with care and under the strictest asepsis many accidents will occur. But these are chargeable to the individual, not the method.

When the contents of the uterus have become septic the method should be the same. Dilate, remove contents, wipe out, and pack. I feel that my experience in abortions justifies me in commending it as the best and safest. In puerperal cases my experience has not been sufficient to speak authoritatively, but I do not believe it will prove an exception. In one case of missed abortion my colleague, Dr. Owen, removed a septic ovum of three and one-half or four months in this manner. The patient became pregnant, the fœtus died for some reason at between the third and fourth month. Later she began to have fever. This continued three months. When she came under the doctor's care she was much reduced by long pyrexia; examination revealed the condition. She made a rapid recovery. This case was an excellent test, notwithstanding the ovum was torn out and not a drop of water was used. The result was perfect. In ordinary cases, where the fœtus has been expelled and the placental membrane remains, and fever has set in, the dry method leaves nothing to be desired.

The only class of cases in which there is any doubt of its efficiency are the puerperal cases or later abortions in which the uterus is markedly affected and a large amount of pus or septic material is found. These are the cases in which frequent or constant irrigation has been recommended, and in many cases is doubtless successful. In private practice this is a very difficult method to carry out. It is not safe to trust it to a nurse, and it requires almost constant presence of the physician, and, besides, in many cases it fails. I believe the manual disturbance is in many instances bad in these cases. The barrier against infection which nature throws out

around any infected area to shut off system-infection is often broken down by such frequent interference. It may be argued that the packing would also; but this latter need not be so often done, and if carefully executed would not do as much violence as the intrauterine douche. If this could be replaced by packing which would not require removal oftener than once, or rarely twice, in twenty-four hours, it would be a great gain. The gauze takes up much of the discharge and keeps the os open, thus preventing good drainage. I have recently used the packing in two puerperal cases, one of which recovered, the other did not; but in neither case was it a fair test, as it was not begun early, nor was it used alone. When I have had an opportunity to fairly test it I will report to you.

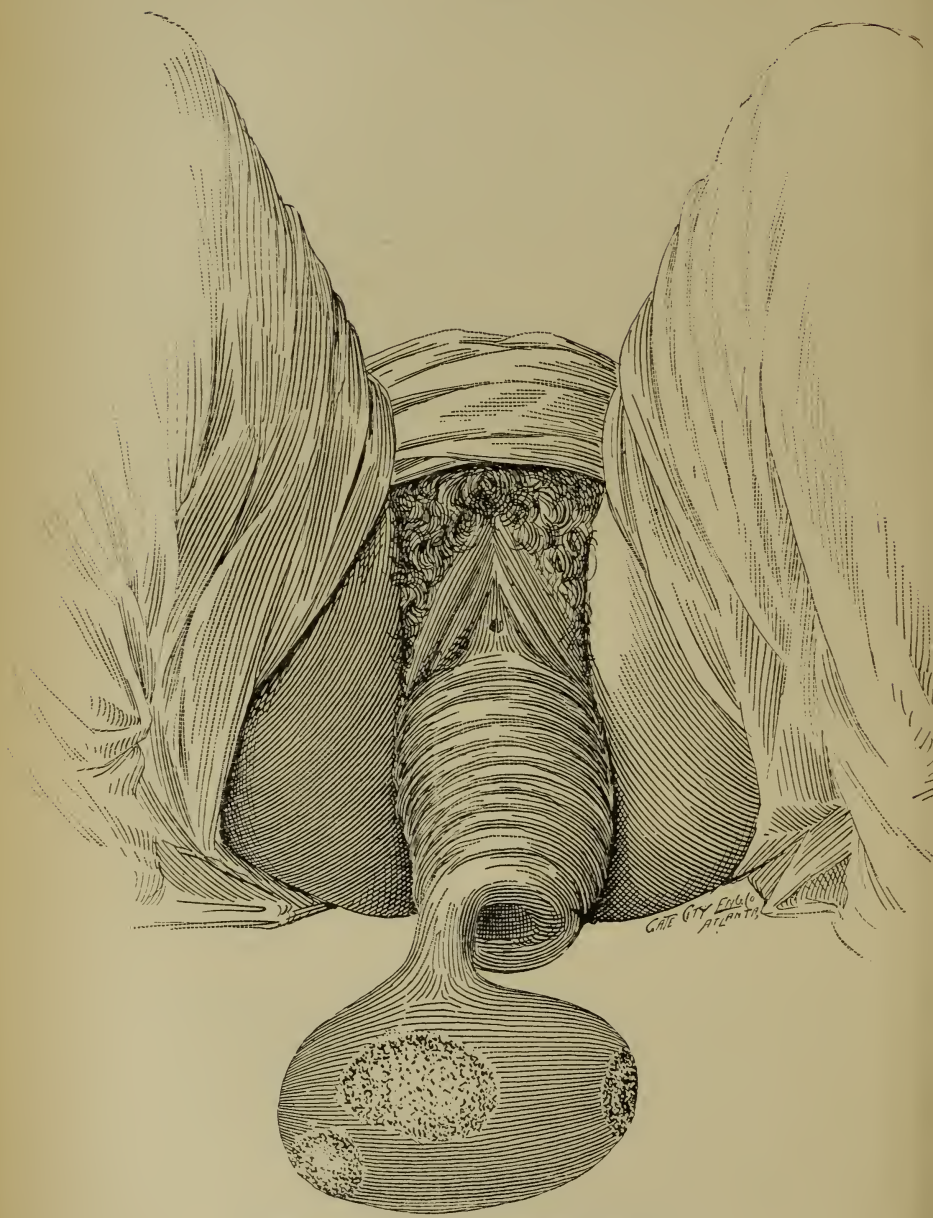
HYPERTROPHIC ELONGATION OF THE CERVIX UTERI, WITH COMPLETE EVERSION OF VAGINA, FROM FIBROID TUMOR OF THE CERVIX. RESTORATION BY OPERATION.

By George Henry Noble, M.D.,
Atlanta, Ga.

Mrs. H., a tall countrywoman, came to me from the mountainous region of Georgia on January 25, 1894. She stated that shortly after her first confinement, which occurred eight and a half years ago, she discovered a tumor, about the size of an ordinary marble, growing upon the neck of her womb, which, after a subsequent childbirth, two and a half years later, had grown to the size of a hen's egg. From this time she dates the prolapsus, the tumor having escaped from the vagina. She had not suffered much, except from the discomfort of aching, dragging, etc. Six years ago the lower extremity of the tumor ulcerated, but afterward healed, and two months before admission ulcerated again, from which she suffered the effects of absorption—accelerated pulse, elevated temperature, chills, profuse diaphoresis, etc.—until she became anæmic and more or less emaciated. The family history was good.

The condition on admission was as follows: Temperature 102.4°; pulse 116, weak and compressible; respiration 22 per minute; menstruation normal; bowels recently constipated; painful and frequent urination, and at times incontinence of urine. The urinary analysis disclosed nothing abnormal, except a diminished excretion of urea. Vaginal discharges profuse and muco-purulent in character. Heart, lungs, etc.,

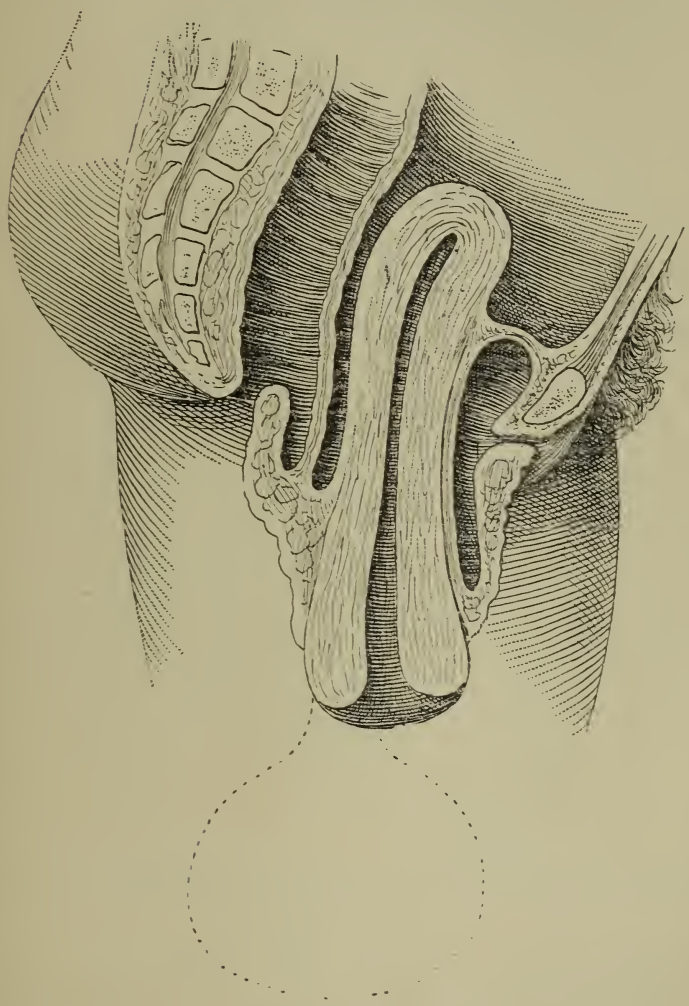
FIG. 1.



Showing tumor and everted vagina before operation.

negative. Inspection shows an egg-shaped fibroid tumor about nine inches long and six inches in diameter, attached

FIG. 2.

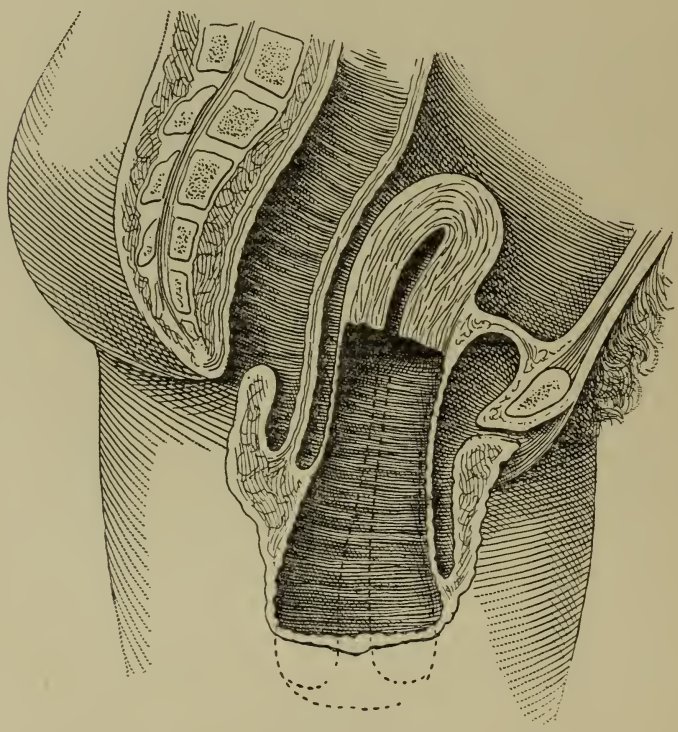


Sectional view of same.

by a pedicle on its side to the upper right margin of the os uteri. There are five superficial ulcers, three upon the ante-

rior and two upon the posterior surface of the tumor, averaging the size of a silver dollar. The vagina is completely everted, not even a sulcus remaining within the vulva. The bladder and rectum are turned out through the vaginal orifice, forming deep pouches in front of and behind the mass. The

FIG. 3.



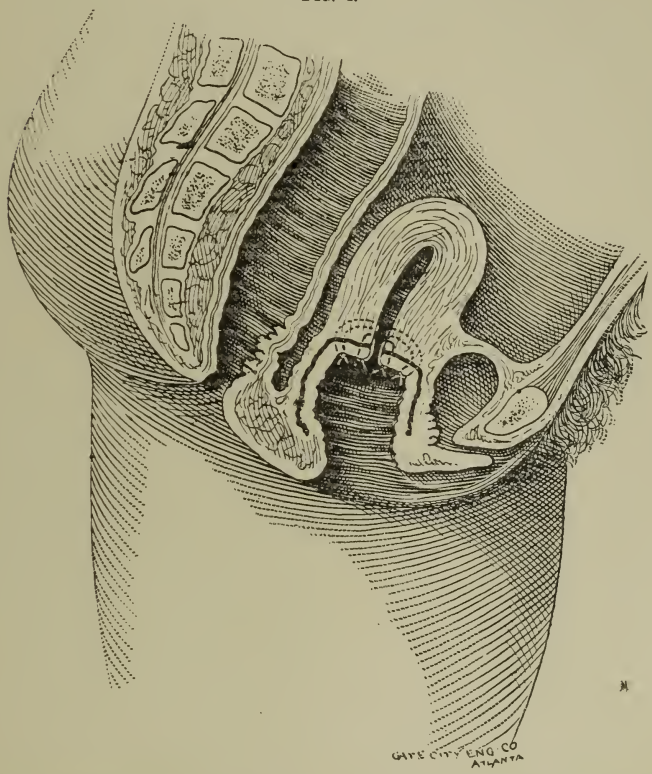
Dissection of bladder and rectum from cervix uteri, and amputation of latter at the internal os.

cervix is as large as an ordinary-sized man's wrist, and elongated sufficiently to permit extrusion of the vagina, while the fundus uteri is near its normal position. The cavity of the uterus is three inches deep, that of the cervix seven inches, making a total of ten inches. The round ligaments are very

much hypertrophied, feeling like cords larger than a lead-pencil. Other pelvic organs seem free from disease.

As hysterectomy is often unsatisfactory in procidentia uteri, I determined to do a supravaginal amputation of the neck and replace the everted vagina, knowing that the supports were equal to the task of sustaining the parts.

FIG. 4.



Showing restoration by inverting vagina, rectum, and bladder, and anchoring with mattress sutures in the stump.

The operation consisted in the usual circular incision, dissecting off the bladder, rectum, and post-uterine peritoneum from the cervix for a distance of six and a half inches, and amputation of the cervix at the internal os, ligating the uterine arteries and other large vessels as they were encountered.

The parts were very vascular; many of the vaginal branches were as large as small quills; consequently, the operation was tedious, frequent ligation being necessary. After removal of the neck of the womb the vagina was stitched to the stump by four mattress sutures, introduced an inch back of the free margin of the vagina, then through the walls of the uterus, beneath the cut surface of the stump, emerging from the cervical canal, then passed in the reverse direction and tied on the surface of the vagina. These sutures served the double purpose of closely applying the vagina to the stump, especially in the angles of the wound, and of controlling oozing from the uterus. The margins of the vagina were fastened by superficial sutures to the mucous membrane of the cervical canal, and the remainder of the wound closed in a transverse line, except at the angles where drainage was provided for. The vagina was dressed with gauze to prevent pouching or pocketing between the opposing raw surfaces. Thirty-eight minutes were consumed in performing the operation.

She made a very fair recovery, considering her condition at the time of the operation. The suppurating tumor having been removed, the temperature dropped, but on the seventh day, when the mattress sutures cut into the tissues, the temperature reached 103°, but came down immediately on removal of the stitches. From that time on her recovery was uninterrupted. The uterus mounted higher in the pelvis, the vaginal orifice contracted to some extent, and the vagina, rectum, and bladder remained in their normal positions.

She was dismissed on the tenth day, and returned to the laborious duties of a mountain farmer's wife. She has been well two and a half years, without any tendency to recurrence of the prolapsus.[1]

[1] At time of publication of this article she has been well more than three years.

HYPODERMOCLYSIS IN SEVERE RAILWAY INJURIES REQUIRING MULTIPLE AMPUTATION.

By James Evans, M.D.,
Florence, S. C.

Wounds inflicted by railways are always serious, inasmuch as the various tissues involved are irreparably injured and usually require removal. It is difficult to form a correct idea of the extent of the injury, as the external appearance of the wounded part does not always indicate the loss of vitality it has sustained, and the damage to the tissues is only revealed afterward by the more or less extensive sloughing which takes place in them. Sometimes in the examination of a limb, more especially when the bones are but slightly injured, only a trivial wound may be seen, yet the cellular and muscular tissues beneath the skin may be injured beyond the possibility of repair, and free hemorrhage is taking place from their torn and lacerated vessels. Considerable shock always accompanies these injuries, and when attended by hemorrhage the depression of the vital forces is often so profound that the condition becomes one of exceeding gravity. If the injuries are multiple and of a character so serious as to require an operation for their repair or removal, the condition is much intensified, and correspondingly greater difficulties must be encountered in our efforts to preserve life. To save life under these circumstances requires prompt and decisive action on the part of the surgeon, and there is nothing which occurs in practice more difficult to determine than the right course to pursue in an emergency of this kind. The victim of one of these railway accidents is brought to the sur-

geon in a state almost moribund, with cold extremities and a weak, small, and rapid pulse, almost imperceptible to the touch; he is restless, covered with clammy perspiration, and has sighing respiration and is in a condition of semi-consciousness. Formerly it was a difficult matter to decide what course to pursue in regard to patients in this condition. The combined effect of the anæsthetic and the shock which would follow an operation of any description, added to the existing profound depression of the heart and nervous system, would almost inevitably prove fatal; yet to defer it death would certainly take place from the more or less hemorrhage that was continually sapping the patient's strength. Usually when operations were performed under such circumstances a fatal result followed. Now, however, a very different termination of these cases can confidently be anticipated by a timely resort to hypodermoclysis. There are cases where the hemorrhage has been so excessive, the system drained of the minimum amount of blood compatible with life, that the only remedy that offers the slightest prospect of preserving life is the speedy and direct transfusion of the blood of another person or animal into the veins of the sufferer. But in the great majority of instances which come under our notice in practice the transfusion of normal, warm saline solution into the subcutaneous cellular tissue answers every purpose, and is attended with the happiest result in saving life, while it is free from many dangers inseparable from the use of the former. Another advantage it possesses is the materials for its preparation are always available and can be easily obtained in almost every locality, and be prepared in a few minutes. It is not necessary to weigh the salt or take the temperature of the water; all that it requires is to put a teaspoonful of salt into a pint of warm water, as hot as can be well borne by the hands when immersed in it. There is some choice to be made in the selection of the spot for the injection, and for some reasons the left side of the chest, in the subaxillary space, is preferable to any other, as it is near the heart, and the injection acts as a powerful revulsive and counter-irritant

to that organ, increasing rapidly the force and volume of the pulse, causing deeper respiration, and restoring, sooner than when injected elsewhere, warmth and color to the surface of the body. The injection should be given either for the relief of shock or hemorrhage, as it will relieve the one and stanch the other, preventing further loss of blood. As soon as reaction occurs give the anæsthetic, and proceed with the operation if one is necessary, and continue the injection from time to time until it is concluded, if there is any faltering of pulse. As much as forty ounces or more may occasionally be used with advantage. As yet the mode of action of the injection of hot saline-solutions on the economy has not been studied with the care and industry such an important subject deserves, and we are not in a position to form an opinion of the metabolic changes wrought in the cells of the body which enable them to afford such speedy relief to nervous shock and hemorrhagic depression. Sir George Johnson attributed the stage of collapse in Asiatic cholera to the contraction of the cells of the lungs, caused by the specific poison of that disease circulating in the blood; and it may be that the semi-conscious state, the weak heart, and shallow perspiration are due to a poison generated by deficient metabolic action caused by shock and a deficient blood-supply, and that the relief afforded by hot saline-solution is owing to the restoration of the circulation of a normal quantity of fluid, and also the dilution of the poison circulating in it. Whichever it may be, there cannot be any doubt that it is incomparably superior to any other remedy for the relief of the depressing effects of shock and hemorrhage.

The narration of a few cases which have recently occurred in my practice will convey a better idea of the prompt relief of all distressing symptoms which follows the use of this remedy:

Case I.—A healthy boy, aged fourteen years, in attempting to jump from a railway train while in motion was thrown down and his left arm and hand horribly crushed. As the

accident occurred some distance in the country, three or four hours had elapsed before he was brought to me. The hemorrhage had been quite free, and was still going on to some extent. He was restless, unconscious, cold to the hips, with a small, flickering pulse and singing respiration. A rubber band was thrown around the limb to restrain further hemorrhage, and a hot saline injection administered. In a short time the body regained its warmth, the pulse acquired considerable force, and consciousness was restored. An anæsthetic was then administered, the limb amputated, the pulse remaining fair and respiration good until the completion of the operation. About six ounces was injected. Speedy recovery followed.

Case II.—Negro man, aged twenty-eight years, was run over by a locomotive, crushing the left foot and the right foot and leg. Saw the man an hour and a half after the accident. The hemorrhage had been quite profuse, the lips and tongue pale, and exsanguined pulse, exceedingly rapid, small, and scarcely perceptible. There was considerable embarrassment of respiration, and the mind wandering and unable to tell anything about the circumstances of the accident. As soon as a warm saline-solution could be prepared it was given by transfusion into the subcutaneous cellular tissue in the subaxillary space of the left chest. Nearly sixteen ounces were administered before reaction took place and the pulse had recovered sufficient volume and force to make it safe to proceed with the amputation of the limbs. Chloroform was administered and the limbs amputated, the left just above the ankle and the right at the point of election, below the knee. Several times during the operation the pulse became extinct and the respiration so much embarrassed that it became necessary to continue from time to time the injection until the operation was completed and the wounds dressed. More than forty ounces were injected into this man, with the happy effect of maintaining in him a pulse of fair force and tension during the operation. Rapid convalescence and recovery followed in this case.

CASE III.—A negro man, aged nineteen years, of fine stature and robust constitution, jumped from a rapidly moving train at midnight, was thrown on the track and run over, crushing the toes and metatarsal bones of the left foot; the bones forming the right ankle were crushed, the posterior tibial artery severed, and the muscles of the subcutaneous tissues of the entire limb below the knee were torn and lacerated and black from the infiltration of extravasated blood. This man was not seen till several hours had elapsed from the time of the accident, and was found in a state of profound collapse, due to shock and the enormous amount of blood which he had lost. Further hemorrhage was somewhat controlled by rubber bands thrown around the limbs just above the wounds, and a hot saline injection given in the subaxillary space on the left chest. Twenty ounces of the solution were transfused subcutaneously before reaction occurred. It was continued until warmth was restored to the body, consciousness had returned, and the pulse had recovered sufficient force and steadiness to make it safe to administer an anæsthetic and proceed with the amputation of the limbs. Syme's operation was performed on the left foot, while the destruction of the soft tissues of the right leg was so extensive as to make it necessary to amputate just above the knee. In this case it became necessary to continue the injection of the warm saline solution until the close of the operation, in order to maintain the strength of the patient and prevent threatened heart-failure. It required thirty-two ounces or more to do this.

Anyone who has witnessed the marvellous effects of the subcutaneous transfusion of warm saline solution in the relief of the collapse from shock and excessive hemorrhage can no longer doubt that it is incomparably the best remedy ever suggested for this condition, and that it has been instrumental in rescuing many from impending death who otherwise would have perished. Soon it will be required of every physician who accompanies an emergency ambulance in our large cities to be provided with the necessary appliances for the administration of this simple remedy in the event it becomes necessary.

It should likewise form a very close essential part of the armamentarium of the military surgeon, and the men under his charge in the rear of the line of battle, who render first aid to the wounded, should be taught when and how to use this remedy and be provided with some simple contrivance for administering it. Each one could be provided with a small alcohol lamp, a few feet of rubber tubing with a large-sized hypodermic needle, and in an emergency even an ordinary canteen could be easily improvised for use. It is pleasant to contemplate how many lives will be saved in future wars by this simple and effective remedy which in the past were left on the field of battle to die without assistance.

PECULIARITIES OF THE SURGICAL DISEASES AND INJURIES OF THE NECK.

By Edmond Souchon, M.D.,
New Orleans, La.

It is here assumed that the student of regional surgery is possessed of the knowledge of the general surgical diseases—*i. e.*, those diseases which may be observed in any other region—and the descriptions will be limited to the peculiarities only which those diseases present when they affect the neck or one of its regions, thus avoiding repetition as much as possible. If no peculiarity is mentioned in regard to diagnosis and treatment, it is because they are the same as for the diseases in general.

This study is divided into that of the diseases and injuries of the neck as a whole and that of the diseases and injuries of its seven regions : the infra-hyoid (including the thyroid body, the supra-sternal fossa), the supra-hyoid, the lateral supra-hyoid (or digastric triangle or submaxillary region), the parotid, the lateral region (or region of the sterno-mastoid, or of the carotids), the supra-clavicular and finally the posterior region.

The following order will be followed in the descriptions : malformations and swellings, injuries, neuroses, softenings, indurations, congestions, inflammations, gangrenes, ulcers, fistulæ, tumors.

PECULIARITIES OF THE SURGICAL DISEASES AND TUMORS OF THE NECK IN GENERAL.

Congenital fistulæ of the neck are due to arrest of development or lack of fusion of the branchial laminæ or folds and clefts of the pharyngeal fissure ; they are sometimes heredi-

tary, but are sometimes discovered only a long time after birth; they may be due there to a cyst which has ruptured externally; they are usually very small, seldom admitting more than a case probe, exceptionally the end of the little finger. The external orifice is situated most commonly on the right side of the neck in front and behind the sterno-mastoid, and between the thyroid cartilage and the sterno-clavicular articulation; sometimes, but rarely, at the angle of the jaw; it is sometimes on a projection, at other times in a fold of the skin; it occasionally presents cartilaginous or osseous particles; it may be found blocked by the dried secretions. These fistulæ resemble congenital tracheal fistulæ, but the latter open commonly on the middle line; they are more rarely found on the side and still more rarely on both sides. The internal orifice may open into the pharynx or larynx or trachea; it is observed almost always near the tonsil and base of the tongue, and is very small; it may become the starting-point of serious inflammation and abscess. When they are complete an injection of milk penetrates the pharynx or the larynx. These fistulæ may be external blind, or internal blind; the external blind are by far the most frequent. The course of the fistula is marked by a cord-like track which corresponds to the track of the fistula; its direction is straight or tortuous, oftenest in the direction of the great horn of the hyoid bone; it is constituted by an external thick, fibrous coat, which forms the cord and is lined by a sort of mucous membrane which secretes a thin, viscid fluid containing epithelial cells, or is purulent. Internal blind fistulæ are very rare, but it is positively known that they exist. They present the variety called diverticula "by pulsion" of the pharynx and œsophagus, due to the dilatation and development of an originally small pouch under the influence of the accumulation of the food; they sometimes form very large tumors. The diagnosis of congenital fistula rests upon the secretion of the fluid, the presence of the cord, the penetration of the probe and the injection of colored fluid. Congenital fistulæ are almost always stationary; they are more a deformity than

a disease. Treatment is usually unnecessary, and fortunately so, because it usually fails when limited to stimulating injections; dilatation and curetting or excision is a laborious operation, not without danger and scarcely justified by the inconvenience experienced. Both orifices may close and leave an intermediate tract.

Congenital atrophy of the whole or more or less extensive parts of the neck is very rare without participation of the rest of the body. We may recall here, however, the naturally long and slender neck of the unfortunate Anne Boleyn, who remarked that her neck would not give the executioner much trouble to sever. The *congenital pigment-atrophy* called *vitiligo* is rather common on the neck. Other skin atrophies are very rare. *Congenital atrophy of the sterno-mastoid* has been observed. *Congenital atrophy of the other structures of the neck* has not been observed.

Congenital hypertrophy of the whole neck has never been reported; neither has partial congenital hypertrophy apart from the congenital cysts and tumors. *Congenital hypertrophy of the constituents of the skin or of the tissues* of the neck are on record; congenital hypertrophy of the thyroid body and of the thymus gland will be studied in their proper places. *Congenital deviations* have been observed, due to malformations or diseases of the vertebræ.

Acquired malformations of the neck. Acquired *atrophic malformations* are observed here as the result of injuries, diseases, operations, cicatrices, as in cases of torticollis.

Acquired hypertrophic malformations of the whole region are noticed; a short neck is considered as a predisposing cause of apoplexy. Hypertrophy of the whole neck is observed in elephantiasis and myxœdema. Acquired malformation of the skin and of the other structures of the neck presents no specially interesting points.

Acquired deviations or asymmetries are seen, especially after burns and cicatrices and after torticollis or paralysis. Cicatrices are due to burns, wounds, abscesses, gangrene, ulcers, fistulæ; they are unsightly and often cause impairment of

function; the skin may be bound down to the sternum; they excoriate easily from traction by the involuntary movements of the parts, and in that case they should be excised and sutured if small, but grafting or autoplasty should be resorted to, to prevent their reproduction, if they be large.

Swellings of the neck. Swellings of the whole neck are frequent; their causes are numerous; they may follow injuries, inflammations, tumors, operations. Their common feature is the great danger from the propagation to the aryteno-epiglottic folds, causing obstruction of the larynx and pressure-symptoms, especially dyspnœa, which it is often impossible to relieve because of the difficulty of reaching the trachea. If an attempt is deemed justifiable, the operator should be provided with an extra long tracheal canula.

Softenings of the neck present nothing peculiar.

Indurations are represented by the peculiar indurations of the sterno-mastoid, which will be described with the diseases of the lateral reigons of the neck.

Injuries of the neck. Burns are here particularly serious on account of the swelling and the œdema of the larynx, which may complicate them. Even when no deeper than the skin they result in cicatrices which are most deplorable because of the appearance of the parts and because of the deviations they cause, sometimes binding the chin down to the sternum; for this reason they should be grafted at the earliest possible time. Deep burns extending to the muscles and to the vessels are most serious, even when limited, for obvious reasons. The cicatrices pass into keloids oftener than in the other regions.

Contusions are not frequent; they are usually produced by falls, blows, hanging, garrotting, throttling, passage of a wheel over the neck, or by the pressure of the dislocated clavicle. A blow on the side of the neck is a great aim with pugilists, because it is almost a sure knock-down or knock-out. It is often in its results grave, because of the importance of the organs of the neck, and may be accompanied by fractures of the hyoid bone, larynx and trachea, injuries to

muscles, vessels, nerves, pharynx, œsophagus, vertebral lesions, concussions and contusions of the spinal cord; hematoma may form and become large and cause grave pressure-symptoms on all the structures. Death may occur after a few days from œdema of the lungs; also from embolism from one of the large vessels of the neck.

Wounds of the neck are comparatively rare in civil practice; sometimes they are accidental and due to a fall on a fragment of glass, a stem of iron or wood; they are most commonly due to attempts at murder or suicide; the suicidal are the most common and the most interesting. The wounds are penetrating or non-penetrating according to whether or not they reach the trachea or the œsophagus or the vessels.

Superficial or extra-fascial wounds of the neck—*i.e.*, wounds not extending beyond the superficial cervical fascia—present nothing peculiar. However, a large incised wound of the external or anterior jugular, especially if these veins happen to be unusually large, may give entrance to air. In tracheotomy the anterior jugular is often wounded; also the inferior thyroid veins. If the parallelism of the lips of the wound has been disturbed, there may be much infiltration of blood; this requires enlargement of the incision and ligation in preference to pressure; cellulitis spreads rapidly. Gunshot-wounds are rare; yet there are instances when a bullet has travelled under the skin and above the fascia without penetration of the fascia. Contused and lacerated wounds, if extensive, may be followed by cicatrices and their consequences. Gunpowder stains should receive as especial attention as those of the face, especially in the exposed parts of the neck. Gunshot-wounds causing much destruction of skin present the same remarks as lacerated wounds.

Deep or subfascial wounds—that is, wounds extending beyond the cervical fascia and more or less deeply—are almost all very serious because of the almost constant injury of some of the large vessels and nerves or of the special organs of the neck, larynx, trachea, pharynx, thyroid

body, giving passage to air, food, blood, each of which calls for special treatment.

Complications of the wounds of the neck are the following: thrombus or extravasation of blood, due to the loss of parallelism of the lips of the wound through the various layers; entrance of air into the veins, more frequent and dangerous here than anywhere else; passage of food through the wound and into the larynx or trachea; hemorrhage more or less profuse according to the vessel injured and its accessibility; emphysema, due to injury of some point of the respiratory tract with a gravity greater than in any other region on account of the involvement of the aryteno-epiglottic folds and the consequent obstruction of the larynx; aphonia from injury to the vocal cords or to the nerves; emphysema, œdema, penetration of blood in larynx, or injury of the pneumogastric or laryngeal nerves; dyspnœa due to the same cause plus injury to the phrenic; dysphagia, due to swelling or pain; erysipelas is a frequent complication; also pyemia or sepsis; œdema of the glottis is very common; spasmodic croup due to pressure or to nerve injury, is not rare; concussion of the cervical column communicated to the spinal cord, to the pneumogastric, phrenic, cervical plexus, brachial plexus, have been observed in severe wounds.

The symptoms of entrance of air into the veins are a wind-sucking or gurgling sound, immediate pallor of the face, dilatation of the pupil, irregular or tumultuous action of the heart, embarrassed breathing, and death. The wound should be plugged at once with the finger, and all the usual means of resuscitation vigorously and persistently applied. The amount of air introduced is a grave factor. If the wound be small, the operation may be continued by keeping the wound constantly filled with warm sterilized water.

The sequels of the wounds of the neck are: permanent aphonia or dyspnœa or dysphagia, necrosis of the cartilages and of the hyoid bone, torticollis due to contraction of the cicatrix, to inflammatory adhesions of the muscles or to nerve

injury; fistulous tracts; granulations obstructing the respiratory tract.

Deep punctured wounds striking the large vessels are those which are most commonly followed by deep and extensive extravasation and traumatic aneurysms; they call for the ligation of the two ends of the wounded vessels; it is here that a proximal loop ligature of the main trunk, low down when practicable, will be of the greatest assistance in controlling the hemorrhage during the search for the bleeding ends. They are also more commonly followed by emphysema than the incised wounds. When they involve a nerve they may cause tetanus or spasmodic croup. Deep incised wounds are often rapidly fatal from the excessive hemorrhage, because it is rare that some artery or vein has not been opened; the same foregoing remarks apply here as to their treatment. Deep contused and lacerated wounds present here no special peculiarities not covered by the above descriptions and the description of these wounds in general. Gunshot-wounds usually cause much hemorrhage; they sometimes recover most unexpectedly; of course, their gravity varies with the injuries inflicted. When the ball is deeply seated no dissection should be made to extract it until later if it produces disturbances.

Foreign bodies in wounds of the neck are common wadding, pieces of clothing, piece of weapon or bullet.

Fractures of the neck are rare; their description will not be considered here.

Dislocations, also *sprains*, are the result of injuries in which the head is much stretched, most commonly and especially when violently striking an obstacle vertex first; they give rise to great pain, particularly when the head is thrown backward. The treatment consists in thorough rest of the part by lying on a bed or by applying a liquid glass bandage.

Poisoned wounds—i.e., bites, stings—are more frequent on the neck on account of its exposed condition; also more grave, because no clothing has protected the parts; also, because they are usually followed by great swelling, which,

reaching the aryteno-epiglottic folds, causes obstruction of the larynx. Bites of a rabid animal are more serious because they have a shorter distance to travel to reach the central organs of innervation, and because no clothing has wiped the animal's teeth.

In all injuries of the neck causing obstruction to the free circulation of the air, from whatever cause, there are great dyspnœa, cyanosis, anxiety; the pulse is full, rapid; there are also aphonia, dysphagia, pain. Tracheotomy should be performed; it is often advisable not to wait for very urgent symptoms to have the operation performed, because death may come on rapidly or suddenly before the patient can be reached.

Surgical neuroses of the neck—i.e., paralysis, spasmodic affections, retractions, neuralgias—are rare except those which affect the sterno-mastoid and the trapezius, and which will be described in speaking of the various forms of torticollis.

Hyperæmia or congestion of the neck often accompanies that of the face, but it seldom exists alone.

Inflammations present most important differences according as they are superaponeurotic or subaponeurotic. Inflammations of the skin proper present nothing peculiar except that erysipelas seldom originates there; it is usually an extension of erysipelas of the head; it is seldom that erysipelas affecting the head will not extend to the neck, and it is also rare that it extends beyond and reaches the trunk. Furuncles and carbuncles may be serious by their extent and by the swelling they cause, which may extend to the epiglottic folds and cause obstruction of the laryngeal opening. Malignant pustules are most common on the neck; the swelling which accompanies this affection is an added danger here if it extends to the aryteno-epiglottic folds. Superficial or superaponeurotic cellulitis is serious only when diffuse or extensive, and for the same reasons as given above. When a superficial abscess forms and has to be opened care should be taken to avoid the anterior and the external jugulars, because they are always pressed toward the surface close to the skin. Deep or super-

aponeurotic cellulitis is a very grave affection, because of the compression due to the swelling, and because these symptoms are increased by the unyielding nature of the fascia. It may be primary, the result of cold, or secondary, due to some injury or some lesion of the teeth, especially of the wisdom teeth, bones, lymphatics, thyroid body, scalp, ear, face, mouth, or to low fevers. It may come from neighboring organs; tonsillar abscess sometimes opens under the inferior maxilla, and deep axillary abscess in the supra-clavicular region, as does also anterior mediastinal abscess. Primary cellulitis and abscess may be due to wounds external or mucous, to fractures, to osteo-periostitis, to osteo-myelitis of the inferior maxilla, to phosphorous necrosis of jaw, to submaxillary adenitis, to thyroiditis, or acute hygroma of the serous bursæ of the neck. Most of these acute inflammations are really adenocellulitis, due itself to lesions of all kinds of the face and neck, superficial and deep. Sometimes the initial lesion is very small and insignificant; often the gland itself does not suppurate, but the connective tissue around it does (periglandular connective tissue); this adenitis may involve the following ganglia: submental (or digastric, or supra-hyoid), infra-hyoid along the middle line (juxta-laryngeal, sterno-hyoid, laryngo-pharyngo-esophageal). In general diseases (diabetes, typhus, pyæmia, typhoid fever, measles, variola, diphtheria, especially scarlatina) these inflammations appear most commonly toward the end of the disease or in the convalescence, and are more frequent here than anywhere else and call for special stress on some of the general features. The micro-organisms met with vary much; beside the ordinary agents of inflammation we may meet with the micrococcus tetragonus, bacilli of typhoid fever, encapsulated diplococci from pneumonia; it is difficult to say which of these microbes are simply phlogogenous or also pyogenous. In abscess from dental caries spirilla of saliva have been met. Actinomycosis may cause cervical abscess, although the organism lives specially in the mouth, in tonsillar depressions, in diseased teeth particularly; they may produce meta-

static abscess in the brain, thorax, abdomen; these abscesses are usually multiple and usually run an insidious and chronic course. Abscesses following injury or scarlet fever sometimes form a hard mass, slow in suppurating, causing great damage; sometimes they bleed alarmingly when opened, even after they have been opened several days, on account of sloughing of the vessels; they may be accompanied by thrombi in the large veins or sepsis. When the cellulitis suppurates the abscess may be circumscribed or diffused; the pus may fuse in the chest, in front of the thyroid and sternum (previsceral route), behind the pharynx and œsophagus (retrovisceral route), or along the carotid and jugular vessels in their sheaths, or in the sheaths of the nerves of the brachial plexus behind the sterno-mastoid, reaching the supraclavicular region and the axilla; it may open into the pharynx, œsophagus, larynx or trachea, pleura, or mediastinum. Retropharyngeal abscesses may be limited; then they project on the sides of the neck in the maxillo-pharyngeal space; when they are median they can be reached through the mouth. In some subacute cases in the upper cervical region and at the root of the neck abscesses have a tendency to become encysted, and finally open on the skin; they may be chronic. When an abscess is near or over the carotid it pulsates, but then there is no expansion.

Chronic abscesses are oftenest due to a constitutional cause; sickly children with bad hygienic surroundings are the most common sufferers; they often start in the glands or bones or cartilages. A residual abscess is one due to the revival of an old cured inflammation. Chronic abscesses sometimes present multiple openings or sinuses; they sometimes ulcerate and perforate the arteries and veins. Scrofulous adenitis has the neck for a seat of predilection; the acute form is very rare; it is more special to adults; when the swellings are established the course is often slow. Simple chronic adenitis is very rare; it is very often scrofulous, but not often inflammatory; it is due to repeated pharyngitis or carious teeth. *En résumé*, the most common causes of cervical cellulitis

are dental affections, lesions of the face and mucous membrane of the mouth and pharynx; diphtheria, and especially scarlatina; hence the great frequency in children and adolescents.

Diffuse abscesses are rare on the neck; they are sometimes gangrenous; they are often the result of a bad general condition, or of a badly treated circumscribed cellulitis. The peculiarities of cervical cellulitis are that sometimes they are very extensive and the general symptoms precede all the local signs of deep cellulitis; usually they all suppurate; also they often cause cerebral anæmia due to the compression of the carotids or to the coagulation of the blood in the compressed artery and vein.

The diagnosis of deep abscesses, especially of the acute abscesses, should be made at once by using the exploring-needle and syringe, not a hypodermic needle, which may not give passage to thick pus, but a needle at least twice as large as the ordinary hypodermic needle. Exploration should be repeated every second day, if necessary.

The treatment is evacuation and drainage, but in these dangerous regions fear of wounding important structures often holds the surgeon's hand when the abscess is one or two inches deep, until it becomes more superficial. By incising on the middle line and going around the trachea the knife can penetrate deeply with safety; also by incising behind the posterior border of the sterno-mastoid or along the base of the jaw. It is recommended by some to cut down and ligate the vessels as they are divided, but when these are embedded in indurated tissue this is almost impossible. Others leave the needle in place and cut down along it, but the divided vessels present the same dangers and difficulties. Hilton's method is to use the knife only to start, and as soon as deep parts are reached to tear with the director and use dressing-forceps to dilate the small entrance gained into the abscess; it offers the same objections. The writer calls his method guided dilatation; it consists in the following steps: as above described, use a proper needle to locate the pus at the

depth of one, two, or three inches; unscrew the syringe and leave the needle in place; introduce through the needle a steel wire seven or eight inches long until it reaches the bottom of the abscess; remove the needle, leaving the wire in place; make a small incision through the skin to overcome the only serious resistance to the introduction of the dilators; take a trocar (with canula) of one-eighth of an inch in diameter, perforated from point to handle, and run it over the wire into the cavity of the abscess; it penetrates by dilating the tissues by the three blunt edges of its prismatic triangular point; then remove this trocar, leaving the wire still in place; take a trocar and canula of three-sixteenths of an inch and introduce it likewise along the wire; withdraw the second trocar and insert in a like manner one of a quarter of an inch, then one of five-eighths; finally withdraw the trocar and the wire and leave the canula in place; through the canula introduce a drainage-tube a quarter of an inch in diameter; remove the canula, leaving the drainage-tube in place. A suitable probe can be introduced through the drainage-tube and a counter-opening made at the proper place. After forty-eight hours the opening can be safely dilated to a half-inch or more if it is found that the quarter-inch drainage-tube is not sufficient. By this method the tissues are not cut, but simply pushed aside all around, uniformly; there is no cutting at any time, since the edges of the triangular point are blunt; a round or conical point sometimes packs the tissues and does not penetrate; if a vessel or a nerve is encountered, it is shoved gently aside, out of the way; that is one reason why the dilatation should be gradual and why it is not advisable to pass at once from a one-eighth to a five-eighths trocar. There is no difficulty experienced, as far as the introduction is concerned, in passing from the smallest trocar to the largest.

Glanders is often accompanied by such swelling of the glands and peripheral tissues that life is much endangered thereby.

Inflammation of the tendons and of the muscles of the neck

is very rare. The sterno-mastoid and the trapezius are sometimes inflamed more or less, acutely or chronically; but this will be described with the surgical diseases of the regions to which they belong.

Periostitis and osteitis of the region will not be considered here. *Arteritis* presents nothing peculiar. *Phlebitis* of the external jugular is sometimes observed, and is recognized by the usual dense cord; it often gives rise to intense pain of a neuralgic character. Phlebitis of the internal jugular is a most grave affection, because of the propagation to the lateral sinuses of the brain; it will be described more fully when treating of the diseases of the region of the carotids. *Lymphangitis* is rare on the neck as a primary affection. *Adenitis* is most frequent, on the contrary, following the diseases of the various organs; they will be treated with the regions to which they belong. *Neuritis* is rare. The special organs of the region, the parotid and submaxillary glands, thyroid body and thymus, are liable to become inflamed, but very seldom, and they will be described further on.

Gangrene of the neck, in whole or in segments, is rare; grafting should be resorted to early to prevent the cicatrices and the consequences.

Ulcers of the neck resulting from inflammation are not common unless there has been sloughing. Strumous ulcers are common and often leave an indelible and much-dreaded telltale cicatrix. This can be removed, when not too large, by excision and stitching, leaving only a linear cicatrix, instead of the irregular and striated strumous cicatrix. Tuberculous ulcers, secondary to the suppurated tuberculous glands, are also among the most frequent and present the same remarks. Syphilitic ulcers are the next in frequency. Cancerous ulcers are more rare; they are usually due to ulcerated cancerous glands, due themselves to secondary glandular infection; they have already been described. *Fistulæ*, accidental, due to wounds, are the most common. Aërial fistulæ are those which communicate with the air-passages; they may be

laryngeal or tracheal; they are usually the result of wounds, accidental or surgical; they may be congenital, but it is rare; the tracheal are the most frequent, and are oftenest due to incomplete transverse wounds and to the retraction and stricture of the lower end; sometimes they result from the removal of parts of the tracheal cartilaginous rings in thyroidectomy, sometimes to tracheotomy. Alimentary fistulæ communicate with the œsophagus or the pharynx, and are called œsophageal or pharyngeal; they are usually the result of accidental or surgical wounds or follow the opening of extensive abscesses. Glandular fistulæ are the most common of all, being due to the suppuration of the glands of the neck. Cellulitis or abscess fistulæ following these diseases are comparatively rare. Fistulæ may remain after the complete removal of tumors; after the simple puncture or incision of cysts, of serous bursæ. Dental fistulæ follow the opening of abscesses due to diseased teeth, especially the wisdom teeth; they do not heal until the culprit tooth is extracted. Osseous fistulæ are kept up by some carious or necrosed bone of the region which has been treated. Fistulæ complicated with erysipelas may be cured by it. Fistulettes may be cured by cauterization. In old fistulæ the orifice is circumscribed by a cicatricial ring intimately adherent to the edges of the loss of substance of the trachea; they demand an autoplastic operation. Plastic operations are necessary to cure many of those fistulæ which remain after the removal of the original cause and after dilatation and curetting of the tract.

Tumors of the neck. The *gaseous tumors* of the neck are represented by emphysema resulting from some wound of the air-passages or of the lungs in the supra-clavicular fossa; it may be due to fracture of the base of the skull extending to the mastoid cells; it may include all the layers and spread over the whole body; the crepitation of emphysema is characteristic.

Aëroceles (laryngoceles, tracheoceles) are tumors formed by air filling an adventitious pouch; this excludes pneumatocele. The predisposing causes are weakening of the tract and em-

physema. The occasional causes are strains (cough, labor). Some are congenital dilatation of the laryngeal ventricles, abnormal prolongations; some are traumatic and due to wounds of the trachea, rupture of the intercartilaginous spaces; some are pathologic, due to dilatation of the glands of the mucous membrane, to ulcerations, syphilitic or due to former disease of the cartilages or to abscesses; they may consist in a single hernia of the mucous membrane through a rent in the walls, or to rupture; they may consist of all the coats, with the penetration of the air in a cavity pre-existing, such as an abscess, or of air into the tissue condensed all around. The symptoms are changes in the voice and resonance upon percussion. The course varies; they are usually persistent. The palliative treatment consists in compression. In some cases extirpation is possible. They present the following forms, varieties, and complications: aërocele with brusque development, which may cure itself; aërocele stationary; aërocele with slow development; aërocele with an irregular course, alternately slow and fast; aërocele simple, due to the rupture of all the coats of the walls, except the mucous membrane; aërocele due to the opening into an abscess; reducible aërocele, which refills by straining; irreducible aërocele, when the orifice of communication has become obliterated; aërocele with alterations of the voice; aërocele due to previous or still existing disease; aërocele with suffocation and dyspnœa, calling for tracheotomy. Pneumatocele is due to hernia or great protrusion of the lung into the supra-clavicular region; it is recognized by percussion and by its disappearance upon pressure and quick reproduction by forced respiration; pneumatocele follows the respiratory movements.

The liquid tumors of the neck are the following: liquid hæmatoma following blows or contusions, or punctured wounds, or incised wounds, when the lips have lost their parallelism; they may result also from a cured aneurism. Angioma is not very rare; it should be left alone if it does not grow; if otherwise, its removal is indicated, but with all sorts of precautions against the bleeding, which is profuse here

especially; provisional or permanent ligatures of the large vessels above and below should be placed as soon as possible after the skin and fascia are traversed. The tissues are to be divided only between the two artery forceps or two ligatures; injuries to the common carotid or internal cartoid necessitating their ligation are grave lesions, also those of the jugular vein, especially when divided high up. Aneurisms are frequent on the neck, but their location so influences the diagnosis, prognosis, and treatment that they will be more profitably studied with the regions where they specially belong.

Liquid cysts of the neck are of several kinds and are known under the following names: mucoid cysts (Lannelongue), branchial cysts, deep dermoid, deep atheromatous tumors, congenital hydrocele of the neck, hygromata, atheromatous cysts of lymph-nodes. They are almost all rare and congenital, but they are not all branchial; their size varies; they are situated along the course of persistent obsolete tracts lined with epithelium, in the neighborhood of the pharynx and larynx and along the larger vessels; they often have prolongations adherent to the muscles, the vessels, the thyroid cartilage and hyoid bone, and even the vertebral column; they are single or multiple, resembling a bunch of grapes. Their walls are sometimes thick or sometimes thin or sometimes absent altogether; the walls and their contents vary according to their forms or varieties. Their shape is globular or oval; sometimes they present independent masses; they are lobulated, which is due to fibrous or muscular bands crossing them and binding them down; their consistence is more or less soft and fluctuating. They may take a sudden and unexplained rapid course and become very large; they may remain stationary; sometimes they become inflamed and hardened or present intracystic hemorrhage, or undergo spontaneous cure; they may burst externally or in the pharynx; sometimes, after having become inflamed and bursted, they leave fistulous openings; this may occur also when they have been opened. Their forms and varieties are as follows: branchial cysts are those which possess a dermoid or a mucoid lining membrane,

which form presents two varieties. The mucous or mucoid cysts are lined with ciliated epithelium; they are usually median cysts. Serous cysts have been confounded with dermoid, mucous, or branchial cysts, although they do not, like those cysts, occupy a definite region corresponding to the branchial fissures. The neck is their seat of predilection, and they serve as a type of their description; when they are single or unique they are almost always on the median line and on the left side; they occupy principally the antero-lateral surface of the neck; they are never as large on the median line, but may be of the size of an orange. Median cysts sometimes spread on both sides, but one side is noticeably larger; sometimes they descend on each side of the chin like a long beard, giving the little patient the strange appearance of an old man. These cysts may exist on both sides; when multiocular they have no special site; sometimes their walls are so thin as to be actually absent. They differ from the pure dermoid cysts of the region by containing no hair and no sebaceous substance. Some are lined with ciliated epithelium; they are usually median cysts; they contain water or thick yellow matter. Dermoid or sebaceous cysts or atheromatous cysts are only truly such when the dermoid structure of the cyst walls can be well demonstrated. They may attain the size of a fist; when lateral they occupy mostly the region of the sterno-mastoid; when median they occupy mostly the supra- and infra-hyoid regions between the hyoid bone and the thyroid cartilage; the median cysts are sometimes a little to one side. They are often subcutaneous, although Langenbeck says that in the neck dermoid cysts are more frequently deeply seated than in other regions and are often adherent to the muscles, ligaments, nerves, cartilages, and even to the vertebral column. They are uni- or pauci-locular cysts; they sometimes contain hairs, seldom cartilage or osseous tissue; when they discharge they often leave fistulous openings. The sanguineous cysts at times are connected with the anterior jugular vein; they contain a reddish fluid, which characterizes them upon exploration; occasionally they re-

main in connection with vessels. They are emptied by pressure, but they refill rapidly; they must not be taken for aneurisms when the vessels impart pulsations to them. Hemorrhagic sanguineous cysts are due to intracystic hemorrhages. Punctures and incisions are sometimes followed by intracystic hemorrhage, which may ultimately end fatally. The lateral serous cysts are the worst, because they become the largest and send more and deeper processes. Polycystic cysts, when extensive, are beyond treatment. Hydatid cysts are not so necessarily congenital as the serous. Bursal cysts call for the same remarks; they are usually over the hyoid bone, the thyroid and cricoid cartilages. Purulent cysts or chronic abscesses of the neck may be due to lesions of the glands or of the surrounding bones and cartilages; although slower in their development, they are subject to all the changes presented by the acute abscesses above described; they sometimes originate in the sheath of the sterno-mastoid.

The solid tumors of the neck are the following: Deep hæmatoma with clotted blood, due to violent contusions, to punctures and ruptures of the deep bloodvessels or to a cured but non-absorbed aneurism, are occasionally met with. They can be diagnosticated by their history, by the exploring-needle; they are to be treated by incisions or by gradual dilatation on a guide if they occupy dangerous regions. Sebaceous cysts may so invade the deep tissues as not to be easily separated by the fingers from the deep parts; they are sometimes comparatively rather hard from high tension; the contents are almost fluid, yet the fluid is too thick to run through an ordinary exploring-needle. Dermoid cysts present the following features: Branchial dermoid cysts of the neck are almost always of the simple type—*i.e.*, sebaceous matter and little hair, sometimes oil. The complex cysts containing osteo-cartilaginous masses are not really true cysts. Median branchial dermoid cysts of the suprahyoid region belong more properly to the floor of the mouth; these are often attached to the symphysis by a hollow or solid pedicle. Median branchial cysts are the most common mucoid

cysts of the neck; their epithelium is cylindric and sometimes ciliated. Dermoid cysts are frequent here; the cyst may be attached to the trachea. These cysts are not bursal cysts; the epithelial lining shows they are congenital; they are all congenital, but they may not become manifest except at a later period, especially at puberty. Lateral branchial cysts usually occupy the region of the sterno-mastoid. Median branchial suprasternal cysts sometimes penetrate into the mediastinum. Median thyro-hyoid cysts often take on a rapid growth at puberty or after confinement; they are often opened by mistake, and this is followed by persistent fistula with mucous secretions. Lipomata are not uncommon; they usually send fibrous prolongations between the muscles and the vessels, extending sometimes to the bones, hence the difficulty and danger of their removal. Simple adenoma or pure hypertrophy is not rare. Strumous adenoma is not rare. Adenoma of Hodgkin's disease, or multiple adenoma, should not be extirpated except to relieve pressure-symptoms. Syphilitic adenoma is of frequent occurrence and is found most commonly along the sterno-mastoid or in the posterior region. Syphilitic gumma is not rare. Solidified hæmatoma resulting from contusions or punctures or ruptures of the deep vessel, or from solidified but non-absorbed aneurisms, are not very uncommon. Simple adenoma or lymph-adenoma is the only incontestable primary tumor developed in the neck. Strumous adenoma and tuberculous adenoma are very common; usually they are secondary and the original lesion is found about the face, neck, mouth, nasal cavities or throat; they usually form a chain and sometimes a long, solid tumor; they usually ulcerate the skin by a granulomatous infiltration; recurrences are frequent. Schüller recommends for them eight to ten drops of guaiacol after each meal in milk.

Primary syphilitic adenopathy of the neck is seen in cases of chancre of the lips and tonsils; it is usually submaxillary. It is peculiar in that it rapidly acquires a large volume, which is an important diagnostic point. Secondary syphilitic adeno-

pathy is common, especially at the nucha; that is the place to feel the pulse of syphilis, says Ricord. They are usually in the groove between the trapezius, in the fossa of the nucha and in the mastoid region, and are usually due to a lesion of the scalp, but may develop under the influence of the poison in the blood. Tertiary adenopathies are rare; they assume the sclerotic or gummatous form. Syphilitic adenoma presents the same features also, especially in elderly people. Lipoma of the neck presents the following forms and varieties: superficial or deep—the deep have been observed near the large vessels, near the carotids, also in the peri-pharyngeal connective tissue; congenital lipoma, diffuse and adherent, or not, to the bones; lipoma with a broad base; lipoma with a narrow base, pediculated (one weighed twenty-nine pounds). Diffuse lipoma affects the nucha specially, and may encircle the neck; congenital and symmetric lipoma have a neuropathic origin. Fibroma is rare; it rises from the fibrous layers, bones, sheaths of vessels, sometimes is embryonic. Congenital branchial fibrochondroma of the neck is seen in all regions of the branchial arches. It occupies almost always the external orifice of a congenital fistula, a little above the sternoclavicular articulation. Myxomata and myomata are rare; one case of chondroma is on record, following chondroma of the scapula; those independent of parotid and lymphatic glands are very rare; some tumors are very large; they may adhere to the vessels and to the deep structures. Cutaneous plexiform neuroma is frequent in the neck. Osteoma is also frequent. Carcinoma, primary and independent of larynx, pharynx, and glands, is rare; it may develop in the aberrant lobes of the thyroid. Some are deep, having developed from the branchial arches. Encephaloid, colloid, and melanotic are rarely primary; when primary they are perhaps developed in the sheath of the vessels and not in the glands; they are almost always due to infection secondary to lesions on the face or the internal cavities. Pulsating encephaloid is extremely rare on the neck. Epithelioma is usually secondary to epithelioma of the face,

larynx, tongue, pharynx, œsophagus, tonsil, pleura, lung, or breast. One or two enlarged ganglions, hard, without pain, appearing toward the age of fifty, are likely to be an epithelioma. Sarcoma of the lymphatic glands is very rare, because sarcoma is propagated through the veins. Scirrhus is rarely primary; it is oftenest secondary to other affected parts. *En résumé*, the infectious granulomata of the neck are tuberculous, syphilitic, leprous, glanderous, actinomycotic. Actinomycosis and glanders first show in the submaxillary and cervical glands.

Special tumors of the neck.—The neck sometimes presents hernial tumors, already described. Also salivary calculi developed especially in the submaxillary gland.

Diagnosis and treatment of tumors of the neck.—Percussion discloses the nature of gaseous tumors; besides, pressure reduces them, violent respiratory efforts reproduce them; pneumatocele follows the respiratory movements. Exploring the swelling with needle and syringe will reveal the fluid or the solid nature of a tumor. The following are the liquid tumors which should not be extirpated: liquid hæmatoma and chronic abscess. Liquid hæmatoma follows blows or contusions, or punctured wounds, or incised wounds, when the lips have lost their parallelism; it may be due to a cured aneurism; it should be left alone unless it causes pressure-symptoms or unless it is too long in dispersing; then it should be aspirated; it should be incised early if it reproduces; it needs disinfecting and a drainage-tube with or without a supplemental opening at the most dependent point. Chronic abscesses may be treated first with injection of iodoform (ethereal or mucilage) or by incision, disinfection, and proper drainage; when they resist this treatment the mucous membrane of the interior should be curetted; when possible the membrane should be extirpated. Recent aneurisms should not be extirpated before trying milder means.

The following are the solid tumors which should not be extirpated: comedones, clotted hæmatoma, recent strumous

adenoma, Hodgkin's adenoma without pressure-symptoms, recent tuberculous adenoma, recent syphilitic adenoma, recent gumma, solidified hæmatoma in dangerous regions, salivary tumor and calculus, hernial tumor, pulsating encephaloid.

Comedones characterized by small elevations of the skin with a black, depressed centre should be treated by squeezing or expression. Clotted hæmatoma is recognized by the same history as liquid hæmatoma, by the fact that very little liquid pours through the syringe and the tumor does not diminish in bulk; it should be incised away from the line of the important structures (vessels and nerves), properly injected, packed, or drained. Recent strumous adenoma is recognized by its presence in strumous children without any symptoms of tuberculosis anywhere. It should be treated here as everywhere else. Hodgkin's adenoma is usually multiple; there exist also enlarged glands in the axillæ and groin; the spleen is enlarged, also sometimes the liver; the white blood-corpuscles are not increased. It should be treated internally by arsenic, ergot, iodide of potassium in high doses. Recent tuberculous adenoma is suspected from the general condition of the patient or from the presence of the bacillus in a central gland removed for that purpose; tuberculin might assist; it is treated on the same principles as incipient tuberculosis of the lungs. Recent syphilitic adenoma is revealed by the presence of syphilitic lesions in the neighborhood, which may account for the enlargement, or at a distance, or by a syphilitic history; the specific treatment is the best diagnostic means. Recent gumma presents the same remarks. Solidified hæmatoma resulting from the same cause as the liquid or clotted hæmatoma, when in a dangerous region, should be incised away from the line of the larger vessels and nerves and the fibrinous clots removed, then properly packed and drained. Salivary calculi are diagnosticated by the needle of the syringe returning a sound as though striking a metallic body; they should be removed by incision, preferably from inside the mouth when possible. Hernial tumors have already been described. Pulsating encephaloid is characterized by

pulsation with expansion and attachment to the bones; when the needle is not thrust too deeply into the cavity it may become filled with serum.

The following are the liquid tumors that should be extirpated: angioma, varix, lymphangioma, persistent aneurism, serous cysts, hydatid cysts, bursal cysts (hygroma), tendinous cysts, persistent circumscribed abscesses or tuberculous abscesses. The following are the solid tumors that should be extirpated: warts, papilloma, xanthoma, mycosis fungoides, sebaceous cysts, dermoid cysts, solidified hæmatoma in non-dangerous regions, lymphadenoma (simple hypertrophy), Hodgkin's adenoma when causing pressure-symptoms, persistent strumous adenoma, persistent tuberculous adenoma, persistent syphilitic adenoma, persistent gumma, lipoma, fibroma, myxoma, myoma, neuroma, chondroma, osteoma, encephaloid, melanotic, colloid, epithelioma, carcinoma, scirrhus, and sarcoma.

In the case of the tumors which must be extirpated to be cured the nature of the tumor cannot be determined positively and safely until after their extirpation, when by a microscopic examination the prognosis is established.

The point of prime importance is to decide if these tumors can be removed and with what difficulties, risks, and dangers.

Superficial or super-aponeurotic tumors are diagnosticated by the possibility of isolating the tumor from the deep parts, by grasping it with both hands and trying to make the fingers join beneath it; when the tumor is too large to be grasped by the hand or the two hands, the radial border of one hand is placed under one side of the base and the other along the other side, the hands are moved toward one another and thus appreciate the thickness of tissue between the two. When very thick it is likely that the tumor has also grown toward the deep parts, and must be studied as a deep tumor. There is absence of pressure-symptoms in superficial tumors. Deep or subaponeurotic tumors are more interesting because of the great danger of their complete removal. They are recognized by the fact of their incorporation with the deep

structures; when large they become superficial and may come close to the skin or become attached to it. The condition of the skin is important to determine; when distended by a large tumor a portion of it must be dissected along with the tumor to prevent redundancy of the flaps; when the skin is adherent it should also be removed. The margins must be next delineated; when circumscribed or limited it is a favorable sign, because the tumor will be easier to remove along a well-determined line of dissection with safety and in its entirety, that far at least; when the margin is diffused it is a most unfavorable feature, because of the uncertainty of the line of dissection and the absence of all assurance of removing all the diseased parts. By freezing sections of tumors on the spot and examining them there also under the microscope is the only positive assurance. The non-adhesion or the adhesion of the tumor to the bones is important to determine; when the tumor is movable it must be determined whether it is clear of the important structures —*i.e.*, of the vessels, nerves, and special organs. When it is clear of the important structures the extirpation will be easier and safer. When it is over or near these structures it is often impossible to determine the degree and nature of the adhesions until the operation has reached that stage. When the adhesions are loose and are easily torn all is well. When the adhesions are resistant then there is constant danger of cutting or tearing away some of the structures, with all the possible risks and dangers. When those adhesions are also extensive the case may be hopeless. Double ligatures and double hæmostatic forceps must be freely used, never cutting except between the two. It is prudent also in those cases to endeavor to locate the large vessels and to pass a provisional ligature under them before dissecting too close to the dangerous points. This provisional ligature is removed after all the bleeding has been controlled, or it may be decided to convert it into a permanent one. When the tumor is adherent to the bone, if it is clear of important structures, again all is well, as it may be gouged out with little risk. When it is over or

near important structures the risk is greater. When the attachment is extensive the risk is also much greater and complete extirpation may be beyond all means.

It is always of the utmost importance to explore the regions of the lymphatic glands which receive the vessels from the affected regions. When the glands are only inflamed sympathetically they should be left alone. When the glands are enlarged in malignant diseases they should be removed; to leave them behind is a grave surgical mistake, since the disease will be reproduced and another operation will have to be performed, whereas it should have been done with the first.

Surgical operations of the neck in general.—The surgical operations for the relief of the affections of the neck in general have been described with the various diseases calling for them. However, the following remarks may be added: in operations on tumors in dangerous regions split the capsule and enucleate contents first, if possible; then remove capsule, but this should only be done as a last resort. In some cases the pressure-symptoms of tumors should be anticipated by tracheotomy, because they may be so sudden that there is no time to perform the tracheotomy; there is less risk and less danger to life than to wait and risk a sudden death.

PECULIARITIES OF THE SURGICAL DISEASES AND INJURIES OF THE INFRAHYOID REGION.

Congenital malformations.—It is in the lower part of the region that the orifices of the bronchial congenital fistulæ of the neck are most frequently met, near the head of the clavicle; they may also be met in the thyro-hyoid region. Median fistulæ below the larynx exist, but their internal orifice is always pharyngeal, not tracheal. Median thyro-hyoid fistulæ also exist, but they are always secondary, resulting from the rupture of a cyst; there exists only one positively identified case on record.

Acquired malformations present no peculiarities.

Swellings of the region are mainly due to the various dis-

eases of the thyroid body, which will be especially described further on.

Burns and the effects of cold are only peculiar in the possibility of being followed by cicatrices which bind the neck and chin down to the sternum in a very peculiar manner.

Contusions are usually due to blows, to the passage of a carriage-wheel, to garroting, to hanging; on account of the presence of the larynx and trachea they may be followed by great concussion-effects altogether out of proportion to the severity of the blow. Contusion of the thyroid cartilage by a blow upon and close to it may cause death without any appearance of a lesion. Contusions may cause rupture of the larynx and trachea. In hanging the compression very often bears upon the base of the tongue, and the larynx with its vessels and nerves are not injured. In strangulation the traumatism is applied upon the larynx and the trachea, which may be torn by the fingers or the rope; all the structures are more or less torn. In some cases lesions of the skin of the neck, of the trachea, and of the larynx may cause inhibition of the heart, of the respiratory organs, and of the brain. It is especially in cases of traumatism of the anterior region of the neck that we observe a complete loss of consciousness and a respiratory and cardiac syncope. This is what takes place in cases of death through incomplete hanging, which does not prevent the passage of air through the respiratory passages. In such cases the red blood of the arteries continues red in the veins, whereas in death by true asphyxia the blood becomes rapidly black in the arteries.

Accidental *wounds* are rare; the most frequent are punctured wounds resulting from a fall on a sharp body. Homicidal wounds are not so rare; they are usually incised wounds, and a cutting-instrument is used by the criminal to make believe they are self-inflicted or accidental. Suicidal wounds are the most frequent; they are seldom punctured; they are usually incised wounds; they are most frequent at the point of the thyro-hyoid ligament or below it; they are lacerated, jagged, deeper on the left side; they are usually

directed from left to right and obliquely downward or transversely across the neck; the large vessels are seldom injured. Usually the suicide, throwing his head back, cuts too high; the trachea and the rigidity of the sterno-mastoid protect the vessels. If the head is too much bent, the larynx, the trachea, and the sterno-mastoid also protect the vessels. If the head is too much bent, the larynx, the trachea, and the sterno-mastoid also protect the vessels. There is usually a single gash. These wounds are more commonly fatal than the other wounds, because the victims are usually intoxicated or are laboring under delirium tremens or insanity; these patients should be watched closely, because they often tear away their dressings and die of hemorrhage. These wounds sometimes present much hemorrhage, although none of the larger vessels are hurt except the anterior jugular vein; there are cases on record where air has penetrated into it and to the heart, causing death. The edges of these wounds are often much separated and have a tendency to roll in on account of the action of the fibres of the platysma; coaptation therefore needs more care. Lacerated wounds are very rare. Gunshot-wounds are also rare. Balls may traverse the neck without wounding any important structures, because the tissues are round in form, elastic, movable.

Bites by dogs are comparatively common; the anterior region of the neck is the favorite aim of dogs, especially the bull-dog; they cause all the lesions of strangulation and of incised wounds.

Non-penetrating wounds—*i.e.*, not involving the larynx, trachea, pharynx, œsophagus, recurrent nerves, and not peculiarly serious—should be treated as elsewhere, taking care to secure the divided vessels, etc. Penetrating wounds due to any cause involving the respiratory or digestive tract and the recurrent nerve are of course severe. Punctured wounds, especially in duels, may penetrate into the mouth, pharynx, œsophagus, larynx, or trachea; it is important to look for such penetrations and to keep the parts as thoroughly disinfected as possible, because there is often risk of infection of

the wound from within. The landmarks are the hyoid bone, the thyroid and cricoid cartilages; the laryngoscope should be used.

Penetrating wounds above the larynx are less dangerous than those of the larynx and those below it; the lower the wounds the more dangerous they are. Wounds through the thyro-hyoid membrane penetrate into the pharynx, injure the epiglottis, the aryteno-epiglottic folds, the cartilages, the vocal cords; they are less dangerous than below, because they allow feeding; they are more liable to suppuration. Wounds of the larynx are comparatively frequent, because of its prominence; they are usually very dangerous, and may be diagnosticated by the rushing sound of the air passing through. They should be treated like those of the trachea. Wounds of the trachea are commonly followed by great hemorrhage, because of the large vessels around it which may also have been wounded by the same cause. When the severance is incomplete there is slight gaping; when the section is complete the lower end is drawn in deep at each effort of respiration, and the soft parts cover up the orifice, causing suffocation. In all cases keep the blood and foreign substances out of the respiratory tract until hemorrhage is checked. Rose's position may be of assistance. In incomplete wounds there is slight gaping, and the wound should not be stitched; the head should be flexed on the chest and fixed in that position by a fluid glass bandage. In complete wounds, when longitudinal, there is little gaping. In complete transverse wounds the retracted lower end should be searched for, a strong thread passed deeply through it, and an attempt at stitching be made; if it fails, a tracheotomy tube should be placed in it; the tube should be longer than the ordinary one, because the swelling may lift it out of the trachea; the head should be kept flexed also; a moist cloth should be placed over the tube; the room should be warm, at about 70°, and a vessel with boiling water should keep the atmosphere moist; all this to avoid bronchitis and pneumonia. Later we should be

mindful of the exuberant granulations which may obliterate the canal.

The sequelæ of wounds of the air-passages are permanent contractions of these passages, aphonia, fistulous orifices, entire occlusion of larynx, the air passing through the external wound; fistulæ are hard to cure. Wounds of the pharynx and œsophagus are usually done through the side of the neck by balls, knives, etc.; they cause much pain, spasms, hiccough, dysphagia, more or less suffocation; there is escape of food through the wound if this be of a certain size; the thirst is great. The patient should be fed by enema; if the use of the œsophageal tube becomes necessary from insufficiency of the rectal alimentation, it should not be left in place, but introduced each time. In incised wounds stitch immediately; in lacerated wounds let the wound granulate. Rupture of the œsophagus from contusions are rare; the special symptom is hæmatemesis. When the diagnosis is sure cut down upon the injured spot along the anterior edge of the sterno-mastoid; stitch the wound if possible; if not, pack and let it granulate.

The immediate danger of wounds of the anterior region of the neck are death from hemorrhage; although the hemorrhage stops from syncope it may start again later; from asphyxia due to the tongue or epiglottis or a piece of cartilage obstructing the passage, or to blood and clots in the larynx and trachea; from penetration of air in the veins. Penetration of the respiratory tract is recognized by cough, bloody expectoration, hissing or boiling sound. The secondary dangers are inflammation of the larynx, œdema of the glottis, bronchitis, pneumonia, abscess, and purulent dissections, emphysema, aphonia more or less complete, dysphagia; secondary hemorrhages are common and serious complications. In all injuries with solutions of continuity of the mucous membrane the most frequent source of death may be mediastinal emphysema and inhalation pneumonia. Wounds of the neck parallel to the longitudinal fibres of the muscles

are more apt to be followed by emphysema. The remote effects and sequelæ may be exuberant granulations, causing dyspnœa; cicatrization, producing strictures of the larynx, trachea, and œsophagus; persistent fistula; paralysis due to inflammatory thickening, which may disappear later, or due to injury of recurrent nerves or the pressure of a bullet. All these complications should be treated as elsewhere.

Dislocation of the hyoid bone is very rare. There is one case (Gibbs) in which the dislocation was muscular; it was accompanied by a peculiar click on the left side of the neck and a sensation of choking; examination showed displacement of the left horn of the hyoid bone; reduction was effected by throwing the head backward toward the right side, so as to stretch the muscles of the neck, and then suddenly depressing the lower jaw, thus bringing the depressors of the hyoid bone into action.

All the following fractures are usually due to violent contusions. Fracture of the hyoid bone is rare, but it is well known; its site is usually the great horn, near the body; it may be unilateral or bilateral; it is characterized more or less by hoarseness and dysphagia; according as it is without or with displacement and without or with deformity, it is accompanied by more severe symptoms, especially when swallowing fluids, which pass into the larynx because of the imperfect action of the epiglottis; it is reduced by using the fingers inside the oral cavity. Fractures of the larynx are less rare than fractures of the hyoid bone; they are due to great violence; they are usually accompanied by much pain and suffocation, often calling for immediate reduction or for tracheotomy. Each cartilage may be fractured by itself; the thyroid is most frequently the site; fractures without displacement are not so grave. Fracture of the thyroid cartilage is more common in old people because of the ossification of the cartilage. Fracture of the cricoid is more dangerous than the others, perhaps because of its small size, which causes slight displacement to be followed by serious obstruction. Fractures or subcutaneous ruptures of the trachea without actual wound have been observed after great trauma-

tism; they are less frequent than the others; they present the same symptoms and indications as the fractures of the larynx, but the lesions are lower down. The trachea should be opened below the fracture and a long tracheotomy tube introduced; when the fracture is low down the lower end should be hooked, raised, and sutured to the skin or upper fragment. Spontaneous ruptures of the trachea due to violent efforts are admitted by some. All these fractures are more serious if accompanied by displacement which obstructs the air-passages. The symptoms are those of obstruction and shock plus those of fracture in general; crepitation, abnormal immobility plus also aphonia, dysphagia, and emphysema. The fragments should be replaced by external and internal manipulations; if necessary, the parts should be incised through and the fragments stitched. Tracheotomy is often indicated; it is well to perform the operation before grave symptoms develop, because these sometimes come on so suddenly that the patient may succumb before the surgeon can be had to operate.

The *diseases of the skin of the infra-hyoid* region present nothing peculiar. The presence of the beard in the upper part of the region renders the part liable to the diseases of the beard described in the affections of the face.

Neuroses of the region present nothing peculiar.

Softening and *induration* also have no special features.

Congestion of the infra-hyoid region presents no peculiarities.

Inflammations of the region are not so frequent as those of the lateral supra-hyoid and of the sterno-mastoid regions; they may occupy the skin (erysipelas, furuncles, carbuncles), the connective tissue, the few small lymphatic glands situated along the anterior aspect of the larynx and trachea, or the thyroid body (the latter affection will be treated separately). Inflammations beginning in the previsceral or retrovisceral space are not frequent, and are usually due to injuries. Cellulitis and abscess of the antero-lateral superficial region present nothing special. Antero-lateral deep or subaponeurotic cellulitis, when median or supra-hyoid or submental, occupies the space between the mylo-hyoid and the fascia; this form is

not to be confounded with the cellulitis developed upon the mylo-hyoid and invading the floor of the mouth. Abscesses of the thyro-hyoid and epiglottic spaces originate in the fatty lobules and lymphatic glands between the epiglottis and the thyro-hyoid membrane; they may be due to lesions of the tongue, larynx, or thyroid body. Laryngo-tracheal abscess causes much dyspnœa and shows a tendency to extend down along the trachea.

Such lesions are often the starting-points of the peculiar broad or diffuse cellulitis of Dupuytren; they are sometimes secondary to cellulitis of the substerno-mastoid connective tissue; they are at times produced by cold, by crying loud, so that the public criers and street venders are more often affected; usually it is women in bad health that are most commonly thus afflicted; men very seldom. These diseases are usually connected with some general diathesis; they may extend from the ear to the clavicle and from the nucha to the larynx; they may involve also the other side. The pus is infiltrated into the muscular interstices and the connective tissue; gangrene is not infrequent. The pressure-symptoms are very great. This description resembles that of the disease called diffused cellulitis of Gray, Coly, and Hannon, which they say is mostly limited to the anterior region of the neck; it is due to cold and humidity and resembles erysipelas; it gives the sensation of hard œdema without fluctuation. The inflammation of the infra-hyoid region gives rise to more risk of œdema of the glottis and to fusing in the mediastinum.

Gangrene of the infra-hyoid region is rare, and presents nothing special.

Ulcers are like those of other regions.

Fistulæ due to congenital malformations have already been described. Those due to chronic inflammatory causes, to chronic adenitis, to bone lesions, are very rare. Acquired laryngeal fistulæ are the most frequent; they may be due to abscess, syphilitic ulceration, tuberculous ulcer, lesions of typhoid fever, foreign bodies, accidental and suicidal wounds, tracheotomy, and other surgical operations. The symptoms

are passage of air with mucus and pus, alteration of the voice; loss of speech unless the orifice is closed; all thoracic and abdominal efforts are impossible. These fistulæ remain permanently. The treatment consists in closing the orifice by an autoplastic operation; Beyer uses two rows of sutures, deep and superficial. The forms and varieties are the following: fistulæ following tracheotomy are oval in shape, the great diameter is vertical, the skin is drawn toward the mucous membrane, it is puckered by cicatricial contraction. Fistula due to large wounds of the neck in which a canula has been introduced have the shape of a transverse fissure; the upper lip is turned in and is cutaneous; the lower is covered with granulations, and is continuous by a long or short canal with the trachea. Fistulæ with occlusion of the larynx occur in transverse wounds in which the skin of the upper lip has been adherent to the mucous membrane of the pharynx, forming a septum directed backward and downward and closing the larynx completely. Fistulæ following abscesses are usually small and funnel-shaped. Fistulæ due to tumors occupy the cricro-thyroid membrane, which may be perforated. In fistulæ with stricture the respiration is difficult. In fistulæ below the vocal cords the patient talks after closing the fistula; the voice is changed in its timbre.

Gaseous tumors of the infra-hyoid region are extremely rare, except traumatic emphysema and median laryngocele or tracheocele; they present no peculiarities.

Liquid tumors. Hæmatoma due to traumatism is not uncommon; the contents should be quickly aspirated if the pressure-symptoms are serious. Angioma varix may penetrate down behind the sternum and prevent their total extirpation without the removal of the corresponding part of the sternum. Aneurisms of this region mostly form a part of the group known as the aneurisms of the root of the neck—*i.e.*, arising from the arch, the innominate, or the origin of the common carotid and the subclavian. They are diagnosticated by the fact that the finger cannot be introduced between them and the sternum. Their treatment is best con-

ducted on medical lines. Distal ligations of the common carotids first, and later of the subclavian, on one side have been performed; also first the ligation of one common carotid, and later of the other. Electro-puncture, Macewen's needling, etc., have all been employed with very few successes. Lymphangioma is very scarce in this region. Serous cysts, outside of those of the thyroid body, are very rare. They are specially represented by the congenital median cysts described above. Bursal cysts develop in the serous bursæ found in front of the hyoid bone, Adam's apple, the cricoid cartilage; they are usually called hygroma or hydrocele of the neck; they form the group of the thyro-hyoid cysts. Hydatid cysts have been observed. The cysts of this region, when punctured so as to be emptied, will sometimes bleed dangerously and fill the cavity to great distention; but this applies specially or almost entirely to the thyroid cysts; if in these occurrences the sac is incised, the bleeding is profuse and very hard to control without removing the sac, using freely double forceps and double ligatures and cutting between them. Chronic abscess or abscess by congestion is not uncommon over the sternal notch on their way from the base of the skull and larynx to the mediastinum. The lymphatic glands of the region may also form chronic suppurative adenitis, scrofulous or tuberculous.

Solid tumors (*i.e.*, those whose contents will not flow through an exploring-needle). Hæmatomata, semi-solid or solidified, present nothing peculiar, nor do sebaceous cysts. Dermoid cysts are not uncommon among the median cysts. The other tumors are all possible, but are all rare. All the tumors of this region present these peculiar features: first, they give rise to more grave pressure-symptoms than anywhere else; second, they are usually in the way of tracheotomy, and relief can only be found by operating; they often penetrate behind the sternum, and in order to follow them it is necessary to remove the upper part of this bone. These retro-sternal tumors should be explored with the syringe first; when fluid they should be treated by incising and packing;

when solid they should be explored by an incision, and, when possible, enucleated. Great care should be taken not to excise any of the deeper parts of the walls, because the large veins of the region are often adherent to them and are thus severed, and uncontrollable deadly hemorrhage supervenes; the walls should not be incised even between the two forceps or ligatures, because if these large trunks are involved the interruption to the circulation may be too serious. Most of these cases are operated upon for palliative purposes of a very temporary nature.

Surgical operations of the infra-hyoid region.—The surgical operations of the infra-hyoid region have been described with the diseases requiring them, but we will here again mention some points of special importance.

It must be well borne in mind that in all cases of injuries and inflammations about the neck the great danger is from suffocation due to the obstruction of the respiratory tract from swelling or œdema of the glottis or from displacements in cases of fractures or ruptures. These accidents often come on so suddenly that the surgeon has not always time to reach the patient and operate in time to save the life; therefore precautionary, anticipatory tracheotomy should be performed upon the least evidence of serious suffocation; it can be well done under cocaine; it will relieve the existing symptoms of dyspnœa, will prevent their aggravation or the death of the sufferer, and will not add to the risks if properly and regularly done; the tube should be long, because of the existing inflammation, and the inflammation that will follow may lift the tube out of its proper position and render the procedure useless, deceptive, and dangerous, since it will lead to the belief that the operation has been done with no benefit. When fractures or ruptures are strongly suspected, after the threatening suffocation has been removed by tracheotomy it is important to examine thoroughly and repeatedly with the laryngoscope to ascertain if there is any obstruction visible with the instrument; if none is seen, and yet a fracture is strongly suspected, the surgeon must explore directly, cut

down to the hyoid bone, the thyroid cartilage, the cricoid, the trachea, and remedy all deviations causing obstruction, using catgut or silver stitches and small silver bands as splints or pins inserted through the fragments. It is of paramount importance that there should be no impediment left when the tracheotomy tube is removed; if all these efforts have not been made, the patient may have to wear a tracheotomy tube for life or submit to the above measures after the fractures or ruptures have united—*i.e.*, under the greatest disadvantages.

In cases of growing aneurisms at the root of the neck, in view of the distressingly painful condition of these patients and of the fact that they are doomed, the surgeon is justified in resecting the upper part of the sternum as an exploratory operation. When it is found that the aneurism is one of the origin of the right subclavian, and that the innominate is not dilated beyond an inch and a half, it is advisable and justifiable to make the desperate attempt to tie the vessel by applying two or three strong catgut or kangaroo ligatures, with as much of a bloodless space as possible between, and tighten them as much as is deemed safe without rupturing the coats. The same remarks apply to the left carotid and subclavian if they are not dilated beyond one inch.

In cases of tumors of the infra-hyoid region penetrating down behind the manubrium, the same resection for exploring-purposes is recommended, with a view to total removal of the tumor if it is found possible.

PECULIARITIES OF THE SURGICAL DISEASES OR INJURIES OF THE THYROID BODY.

The location of a disease in the thyroid body is recognized by the fact that the organ ascends and descends with the larynx during deglutition. Another way to determine if the tumor is of the thyroid body is to seat the subject with the head stretched back and resting; then with the thumb communicate a slight but brisk movement from below upward; if the tumor moves, it is because it is not adherent or is little

so. This is said here once for all. When the tumor is very large this is not very easy to ascertain, and reliance must be placed upon the past history and information and upon some of the peculiar features of the affection described below.

Absence of the thyroid body has been observed occasionally in whole or in part, and congenital atrophy has been also occasionally observed.

Congenital hypertrophy is more common. We must bear in mind that the thyroid body grows after birth, whereas the thymus and supra-renal capsules rather diminish after birth. The hypertrophy may attain rapidly or slowly, in a regular or irregular manner, the large size seen in cases of goitre; it may affect the whole region or one side only, or even one part. There are also cases of aberrant thyroid, due to the separate development of some of the lobules of the organ; these may be single, double, or multiple, or unilateral, as low down as the sternum or even behind the manubrium. These are cases of supernumerary, double, triple, and quadruple thyroid body.

Acquired atrophic malformations are due to injuries, to diseases, and to surgical operations destroying or removing the gland in part or in whole. The total destruction or removal of the thyroid gland gives rise to a peculiar train of symptoms. The immediate sequels of total destruction of the whole gland by thyroidectomy are acute mania, tetany, hysteria, myxœdema, cachexia strumipriva. Myxœdema should be described in connection with the face. We will only recall here the most peculiar features.

Few who have been operated upon before full growth escape; the signs begin to show on the third or fourth day; there are paleness, lassitude, weakness, anæmia; swelling and coldness of the extremities; muscular tremor, swelling of fingers first, then of the rest of the body, mostly apparent in the face and neck; this swelling is not œdema; it is hard and elastic without pitting; the face presents the characteristics of this swelling in the highest degree; there are also cephalalgia, vertigo; the pulse is small and filiform. In

tetany there sometimes exists such swelling, but it is not infectious. The complication is prevented by not removing the whole gland, by leaving a piece, especially the one that is adherent to the trachea. The best treatment of this condition is the thyroid extract or the transplantation of the thyroid gland of the sheep in the connective tissue of the abdomen. The changes are relative to the repartition of the mucin and other metabolic wastes. Pachydermic cachexia (or myxœdema of English writers) resembles myxœdema, and results from the destruction of the gland by disease. Acquired hypertrophies are represented specially by the various conditions known as goitre, which will be described with the tumors of the thyroid body.

Swellings of the thyroid body are almost all due to the various kinds of goitre, more or less chronically inflamed.

Burns and freezing are only observed in cases of great and deep destruction of the neck.

Contusions are most common in all cases of much violence to the neck as have been described above, coexisting or not with fractures of the hyoid bone, larynx, and trachea. The peculiar features they present are symptoms of cerebral congestion, and also the fact that they may be followed by myxœdema.

Wounds of the thyroid body are apt to be serious on account of the great vascularity of the organ and its friability; the bleeding is usually great, especially if breathing be obstructed or laborious. Punctured wounds are rare in the normal thyroid body, but are comparatively frequent in the hypertrophied organ or goitre, and if deep give rise to serious hemorrhages. Incised wounds are usually suicidal; those of the upper angles are the most frequent and the most serious, because of the presence of the superior thyroid artery; in goitres they suppurate, as a rule, and they usually also run a benign course. Lacerated wounds are not ordinarily followed by primary hemorrhage, but may present serious secondary hemorrhage. Gunshot-wounds call for the same remarks; the thyroid gland has been carried away by a missile. Treatment of hemor-

rhage is difficult because of the friability, which will not allow a ligature to hold tight enough to arrest the bleeding with safety against secondary hemorrhage. The same remarks apply to the forceps left *in situ.* Deep suturing succeeds best, or a chain ligature or a purse-string ligature; a pin or needle suture, such as is used for harelip, sometimes succeeds; pressure is not borne; it is useless to ligate the nearest trunk, because the other vessels will keep up the hemorrhage; when the bleeding is serious, tracheotomy, if practicable, sometimes stops the hemorrhage by relieving its congestion; in spite of all, death is sometimes the result of hemorrhage. As regards foreign bodies in wounds, there is not a case on record where a bullet was found buried in the thyroid body in normal thyroid. Poisoned wounds, bites, and stings are rare except in conjunction with such in the infra-hyoid region.

Neuroses of the thyroid body are most rare and present nothing very peculiar.

Softenings and *indurations* are rare, except those connected with diseases of which they are but a symptom.

Congestion or *hyperæmia* of the thyroid body is frequent on account of the great vascularity—*i.e.*, simple congestion independent of any forming or formed goitre. The causes are all internal; the physiological ones are efforts of all kinds, menstruation, coition, pregnancy, accouchement; the most common pathological causes are impediments to the venous circulation, the existence of infectious diseases, intermittent fever, endemic influences; repeated congestions cause goitre. The pathological changes of structure are usually absent; sometimes apopletic foci are found. The symptoms are usually bilateral; the tumor follows the movements of the larynx; when the patient makes an effort the facial and temporal arteries diminish in strength owing to the compression of the carotids, the cervical fascia in front preventing the gland from expanding in that direction. The prognosis is usually favorable, but when often repeated from pregnancy, attitude, or professional occupation, it may give rise finally to a paren-

chymatous goitre. The treatment consists in removing the cause and in the treatment of congestion in general. When suffocation occurs, save during pregnancy, the trachea should be raised by a tenaculum; if this is insufficient, perform tracheotomy; during pregnancy, if the above means do not afford relief, the uterus might be emptied through the vagina or by Cæsarean section.

Thyroiditis, sometimes called inflammatory goitre, acute goitre, strumitis, is usually unilateral. The external causes are the various traumatisms, infections of any ordinary wound, the influence of cold, etc. The internal causes are an effort causing a hæmatoma, the influence of rheumatism, a pre-existing infectious disease, especially pyæmia, puerperal fever, diphtheria, measles, pneumonia, typhoid fever, and malaria. The pre-existence of a congestion or tendency to a goitre is a great predisposing cause; if it discloses itself in a manifest goitre, small or large, it is not a true thyroiditis, but a strumitis. Suppurating thyroiditis is always of microbic origin. The pathological peculiarities are that death may take place before suppuration has been established; when formed, the pus may burrow in the mediastinum, along the respiratory tract and the œsophagus. The peculiar symptoms are: great thirst, owing to difficulty in and aversion to drinking, on account of the pain in swallowing; raising at each pulsation of the carotid arteries; cephalic symptoms due to the pressure upon the veins; great congestion of the face and epistaxis, due to the same causes; nausea and vomiting, due to pressure on the pneumogastric nerve. The course is continuous; the duration about fifteen or twenty days. The terminations are by persistent indurated spots or by suppuration, but it is very rare; sometimes abscesses are formed, fistulous openings, single or double, occur; the abscesses may open into the larynx, trachea, œsophagus, or may burrow in the mediastinum; gangrene of the gland sometimes takes place. The prognosis of thyroiditis is grave. The forms and varieties and their peculiarities are: In *thyroiditis a frigore*, which has served as a type for the above description,

the mortality is much less. Rheumatic thyroiditis usually recovers; but the thyroiditis due to and following a grave general disease presents the highest mortality. In thyroiditis due to an anterior condition of the gland the pressure-symptoms are worse; it almost always suppurates; if the patient survives, the incipient goitre is sometimes cured. The internal treatment consists in combating the cause; the local treatment, in locating the pus as soon as possible and evacuating it; the great vascularity of the organ necessitates the very cautious use of the knife, the evacuation by the method of dilating upon a guide is indicated here especially. Chronic thyroiditis of a normal thyroid body is as rare as it is frequent in goitres.

Gangrene sometimes follows serious injuries or inflammations of the gland.

Ulcers do not exist outside of goitre and tumors.

Fistulæ are sometimes observed after the opening of abscesses or incised cysts and tumors.

Tumors of the thyroid body. Gaseous tumors do not exist in the thyroid body. Aërial goitres are really tracheoceles. Cystic tumors are represented especially by hæmatoma following an injury or due to a hemorrhage in a pre-existing cyst either from a traumatism or from a puncture with a too large needle and removal of all the liquid or enough to destroy the equilibrium of the pressure. The cyst originally called a hydrocele is then called a hæmatocele or a form of angioma. Pulsation in thyroid tumors is not uncommon, owing to the pressure on the great vessels. Lymphangioma represents a form of goitre. Congenital serous cysts of the thyroid are very rare. They must not be confounded any longer with the serous cysts of the neck; the gland is usually atrophied by the cyst, like salivary glands when cysts are located in them. Congenital mixed cysts are the most common; they contain thyroid vesicles, pavement epithelium, cartilage, and muscular fibres. A peculiarity of the thyroid cysts is that whether small or large they may form sudden congestion or rupture, cause sudden great dyspnœa, which

may be rapidly fatal. Cystic growths of the thyroid should be enucleated, as this avoids any possible injury to the recurrent laryngeal nerve, and also avoids the possibility of cachexia strumipriva by leaving all the gland that is not diseased.

Solid tumors are represented mostly and almost entirely by goitres; although they sometimes contain cavities or cysts, yet their walls are usually so thick they are considered as solid tumors and are described with such. The great majority are simple hypertrophies.

Goitre is an enlargement or hypertrophy of the thyroid body without structural changes; it may involve the whole region or be unilateral or bilateral; it is more frequent on the right side.

The causes of goitre in general are not yet known. Women are more liable; children are seldom affected before ten years old. The alterations as regards size and shape are variable. The microscopic alterations consist in cavities, channels, and compartments lined by a pavement or cylindrical epithelium. This form of goitre is the primordial form; it is epithelial or follicular; the other forms of goitre are only modifications of it.

The symptoms are those of a hypertrophied gland in general; the peculiar symptoms are: the shape of a horseshoe; the movements follow the larynx; the veins develop on the surface; the peculiar deformity of the region; the pressure-symptoms on the cerebral and facial circulations. The course is usually very slow and sometimes irregular. The duration is ordinarily very long.

The prognosis becomes serious with the degree of pressure-symptoms and the complications. The true treatment of goitre consists in extirpation, especially if it grows and if the pressure-symptoms are serious. We must bear in mind that an apparently innocent goitre may suddenly enlarge and cause suffocation or even immediate death.

The internal treatment consists in long-continued thyroid feeding, which will diminish the size of a goitre and even bring on a condition of atrophy, so that the danger lies in

abolishing the functions of the thyroid. Sodium phosphate has the same effect and consequences. We should be careful in using anæsthesia if there are already signs of pressure; the use of morphine or cocaine is preferable. Operation with cocaine is often possible; the pain does not seem to be beyond endurance; the dangers of the operation are much lessened without anæsthesia; there is much less turgescence of the veins than when an anæsthetic is used, and the dangers of complications from coughing and vomiting are thus diminished. The incision should extend from one side of the neck to the other in a very sharp and long curve, with convexity downward toward the sternum. The upper part of the tumor had better be attacked first and the upper vessels tied, then the middle or the inferior; the hemorrhage is reduced to a minimum by careful hæmostasis by means of forceps and double ligature of the larger vessels before incising between the ligatures. When the inferior thyroid artery is being dissected and tied, by engaging the patient in conversation for a few minutes the possibility of including the recurrent laryngeal nerve in the ligature is avoided, as the altered voice immediately warns the surgeon of the danger. In the lower right angle is the part which often penetrates into the mediastinum behind the sternum; there exist usually at that point large veins. When possible lift the gland from its bed and encircle the pedicle with an elastic tubing before enucleating, as recommended by Rose and Poppert (Keen). The dangers are hemorrhage and asphyxia by blood flowing into the trachea when it is torn; to avoid these perform preventive tracheotomy when possible. In the hypertrophied thyroid the arteries are larger than in the normal, but they are in their usual situations. Be careful not to tear the trachea again; if this happens, introduce at once a tracheotomy canula —a very long one. In exophthalmic goitre Kocher resorts to ligatures and ties only three arteries. In one case, when four arteries were ligated, tetany set in immediately. Intracapsular enucleation is the safest, but is not always feasible. When the difficulty of tracheotomy is due to pressure, division of the isthmus may afford relief.

The forms, varieties, and complications are the following, according to their number and extent: unilateral goitres, bilateral goitres, whole or entire goitres, aberrant or ganglionic goitres; plunging or retro-sternal, retro-tracheal, retro-œsophageal, peri- and retro-vascular goitres; supra-clavicular goitres, colloid goitres. According to the etiology: primordial goitre, sporadic goitre, endemic goitre, epidemic goitre, congenital goitre, menstrual goitre, pregnancy goitre, old age goitre, metastatic goitre. According to the symptoms: goitre voice, cystic goitre, pulsating or external or aneurismal goitre, venous or varicose goitre, cavernous goitre, solid goitre, fibrinous goitre, fibrous goitre, calcified goitre, osseous and cartilaginous goitre, hydatid goitre, aërial goitre, constricting goitre, diffuse goitre, goitre with a broad base, goitre adherent to trachea, sclerotic goitre. According to course: acute, subacute, chronic. According to prognosis: benign, malignant. According to complications: hemorrhagic (in a cyst or interstitial), or suppurating goitre, congestive goitre, exophthalmic goitre, goitre with emphysema of lung, due to impeded respiration, goitre with chronic bronchitis or tracheo-bronchial catarrh, with pulmonary œdema, goitre with dilatation of right heart, goitre with cerebral anæmia due to compression of the carotids, goitre with weak pulse, inflamed goitre or strumitis. The foregoing designations indicate the meaning of the form or varieties and the peculiarities attached thereto. However, some of them need additional explanation.

Aberrant goitres are those found in the supernumerary thyroid bodies—*i.e.*, those in the lobules developed independently and which failed to unite with the body of the gland; they are sometimes called ganglionic goitres because they resemble hypertrophied lymph-nodes. Peri- and retro-vascular goitres are those which send processes around and behind the large vessels of the neck. Colloid goitre is one that attains the largest proportions; it may be congenital; it begins to grow when the child attains seven or eight years; after forty there is no more risk of having it; females are much more often affected (only 26 men in 551 cases); this is due to the influ-

ence of menstruation, pregnancies, accouchements; runners are much more affected by goitre, as also all professions where the neck is stretched or efforts are made; malaria, by causing internal congestion, favors the development; heredity is not so well established as for endemic goitre. Endemic goitre is peculiar on account of its connection with cretinism; in all countries, in all climates, and in all races there are regions where cretinism prevails endemically, and it is associated with endemic goitre. This goitre is the initial basis of a degeneration of which complete cretinism is the last stage of culmination; the influence of heredity is undeniable; 80 per cent. of cretins are born of goitrous parents. The action of water is also undeniable, as goitre may develop or stop, according to the changes in the water, and it was thought that the absence of iodine in the water was the cause; it is now believed by some that goitre is an infectious disease, whose parasite is in the water. Epidemic goitre is met with where there is an agglomeration of people, prisons, boarding-schools, barracks, but it is only observed in goitre countries. Goitre in old people after fifty years gives bad results when operated upon. Cystic goitre is characterized by cystic cavities in the goitre; these may be unilocular or multilocular; they must not be confounded with the simple serous cysts of the thyroid above described; although their origin is the same, yet the cysts are amenable to a different treatment as described also above, and are a separate disease clinically. Aërial goitres are simply cases of tracheocele. Sclerotic goitre is one which has undergone fibrous degeneration. Acute goitre is characterized by a sudden growth due to congestion, inflammation, and hemorrhage. Hemorrhagic goitre is due to hemorrhages occurring either in the cystic cavities, as in cases of cysts of the thyroid, or in the walls, or interstitial hemorrhages.

Exophthalmic goitre, or Basedow's or Graves's disease, is accompanied by protrusion of the eyeball and tachycardia, with irregular, frequent, loud sounds; the heart is dilated; there is also alteration of the normal sounds; the arteries of the wrist and head throb. These symptoms are due to changes

in the middle and lower ganglions of the sympathetic. Suppuration is very rare. There is a surgical exophthalmic goitre, due to the pressure upon the nerves, purely mechanical and very distinct from Graves's disease. In goitre with a feeble heart and a weak pulse great care should be exercised in operating. Inflammation of a goitre is called strumitis; it is much more frequent than thyroiditis or inflammation of a normal thyroid; it is serious because of the enlarged condition of the organ. Tracheotomy may be performed for relief until the pus is located and evacuated by incisions or by dilatation upon a guide. The diseases or complications of goitre are wounds, contusions, congestions, inflammations, hemorrhages, cancerous degenerations.

All the other solid tumors of the thyroid body are rare, sebaceous cysts, dermoid cysts, fibrinous hæmatoma, lipoma, adenoma, tuberculoma, syphiloma, fibroma, myxoma, neuroma, chondroma; encephaloid, melanotic, colloid, epithelioma, carcinoma, sarcoma, scirrhus.

Tuberculoma and diffuse tuberculosis are rare; they have never been observed primarily; they existed secondarily seven times out of one hundred consumptives, especially in the acute form; sometimes fistulous openings remain. Syphiloma is represented by gummata, which have been found in children affected also with visceral syphilis. Fibroma of the thyroid body is barely known. A case of osteoid chondroma is reported; also a case of osteoma, but this case is doubtful. Sarcoma is more frequent and has been observed in all its varieties; the difference between hypertrophy and sarcoma is that usually the hypertrophy has the same shape as the gland, whereas the sarcoma has not. Carcinoma is also among the frequent tumors of the thyroid outside of goitre. It is sometimes connected with the œsophagus or larynx; it may be metastatic from the cancer of some other part. The primitive cancer is the one here considered; it is rare, and is met especially in goitrous countries; its malignancy is great; generalization is the rule, and the secondary tumors are found especially in the lungs, the mediastinum, and the bones. Such

cancers are transformations of goitre; they are at first movable, like all thyroid tumors, but soon become adherent and immobilized; the limits soon become diffused, and it is impossible to isolate them with the fingers behind and feel the carotids pulsate; this is an important diagnostic sign. The palliative treatment consists, as for the other tumors, in tracheotomy and feeding by œsophageal tube.

Surgical operations on the thyroid body. The following remark covers the peculiar features in operating on tumors of the thyroid other than goitres, that there are usually no large vessels, and enucleation is possible because, in growing, the tumor compresses the tissue of the gland and the vessels peripherally.

PECULIARITIES OF THE SURGICAL DISEASES AND INJURIES OF THE SUPRAHYOID OR SUBMENTAL REGION.

The *congenital malformations* of this region present no peculiarities worthy of notice. The *acquired malformations* of peculiar interest consist in the double chin produced by an accumulation of fat in the region.

The *swellings* of the region have nothing characteristic.

Burns are of peculiar importance because the resulting cicatrices may draw the skin of the chin and of the lower lip, causing eversion of the lips and its consequences.

Contusions here are rare because of the protection of the chin. In hanging the compression may often bear on the base of the tongue; the vessels, nerves, and larynx are uninjured.

Wounds of the suprahyoid region are very seldom homicidal, but almost always suicidal. Penetrating wounds only are of importance; punctured wounds are very rare; they are only observed in the cases of "hooking" of the chin. Incised wounds, when transverse, usually gape a great deal, but very little when longitudinal; usually the suicide, throwing his head back, cuts higher than he intends, in the suprahyoid region, so that the borders of the stretched sterno-

mastoid protect the vessels. The penetrating wounds open the cavity of the mouth, injure the tongue and epiglottis; there may be suffocation due to the blood or other foreign substances, or to the tongue or epiglottis falling back and occluding the larynx; there is usually much hemorrhage from the wounding of the lingual artery. More than in all injuries of the neck we meet here with swelling and œdema of the aryteno-epiglottic folds, which are directly injured. The gaping is especially great when the head is thrown back; the saliva and food pass out of it during deglutition. Wounds of the epiglottis cause much suffocation, difficulty of speech and of deglutition, coughing; thirst is a common symptom. Lacerated wounds have been observed in several cases of "hooking" of the chin. Gunshot-wounds seldom penetrate posteriorly, because the head, being usually thrown back, the revolver is naturally directed upward and rests under the chin, which is usually carried away by the shot. Poisoned wounds, bites, and stings present nothing peculiar here. Foreign bodies in the wound are here represented by alimentary matter. The shock is as great here as in all injuries to the air-passages on account of the dyspnœa and aphonia and dysphagia.

Neuroses are of no special interest, nor are *softenings* and *indurations*. *Congestion* or hyperæmia presents nothing peculiar. *Inflammations* of the skin are the same as those which affect the beard of the chin; they are of no peculiar interest.

Superficial cellulitis—*i.e.*, developed between the fascia and the skin—is of no peculiar consequence.

Deep cellulitis develops between the fascia and the mylo-hyoid muscles, and is more serious; it must not be confounded with the cellulitis developed above the mylo-hyoid and invading the floor of the mouth. Adenitis of the submental or digastric glands is the usual starting-point of the inflammation of the region; it extends to the surrounding connective tissue and becomes an adeno-cellulitis and phlegmon; it is accompanied by great swelling, increased by mastication and deglutition.

The inflammation of the excretory salivary ducts is rare; it is a propagation from and through the mouth; there is retention of saliva, sometimes of pus; the needle and probe strike no calculi; in some cases the gland itself is swollen. Chronic inflammations of the region are most rare.

Gangrene presents here no peculiarities, nor do *ulcers* or fistulæ.

Gaseous tumors are almost unknown in this locality.

Liquid tumors are most commonly cysts. Congenital branchiogenic cysts of the region of the hyoid bone extend sometimes into the mouth and resemble ranulæ, but they are independent of the submaxillary and sublingual glands. Simple serous or supra-hyoid grenouillettes have been studied only recently; they are usually seated underneath the cervical fascia; they are very often an extension of sublingual cysts or grenouillettes through the muscles of the floor of the mouth. Dermoid cysts sometimes remain dormant for a while and then become apparent; if by the history the cyst may be traced to infancy, it is a dermoid cyst.

The *solid tumors* of this region which are the most common and peculiar are the secondary involvement of the digastric or submental lymphatic glands in cases of erosion of the middle of the lower lip; they are comparatively seldom involved, and when thus involved the whole lip is diseased; still they must be looked for, because if overlooked and neglected they may be the starting-point of a new growth which will require another operation later.

Foreign bodies in salivary glands are more frequent in Wharton's duct; they may be a bristle, fishbone, straw, hair of a tooth-brush. There are pain, swelling of gland, abscess, fistula. They may give rise to salivary colic. The treatment is that of all similar cases. All the other tumors are rare and present no peculiarities.

Surgical operations of the supra-hyoid region. The deep surgical operations of the supra-hyoid region opening into the mouth are serious for all the reasons explained above in connection with the wounds of the region. These are still more

so if there is loss of substance and the edges cannot be united; the result is a fistula with its possible consequences.

PECULIARITIES OF THE SURGICAL DISEASES AND INJURIES OF THE SUBMAXILLARY REGION, *i.e.*, LATERAL SUPRAHYOID OR DIGASTRIC TRIANGLE.

The *congenital malformations* present no peculiarities except that at times the orifice of a branchial fistula is observed there. *Acquired malformations* present no peculiar interest, neither do swellings.

The *diseases of the skin* most frequently observed here are morphœa, sycosis, acne, sarcoma of the skin.

The *injuries* present some peculiar interest because they may injure the facial or the lingual artery or the hypoglossal nerve, and also because they may penetrate into the mouth. In regard to the diseases of the deep parts it is well to state here at the outset and to bear in mind that the overlying lymphatic glands are more often affected than the tissue of the submaxillary salivary gland itself, and that practically it is immaterial which is involved.

Neuroses present no peculiarities, nor do *softenings* and *indurations*.

Hyperœmia is represented here by the *submaxillary mumps*, seated in the salivary glands, very rarely existing independently and usually associated with parotid mumps.

Inflammation under the form of phlegmon is very common in this region. It is usually due to lesions of the face, mouth, tonsils, and especially dental caries, with periodontitis. It usually begins in a lymphatic gland as an adenitis, then invades the connective tissue around or becomes an adeno-cellulitis; this adeno-cellulitis seldom invades the neighboring regions, especially the infra-hyoid. Inflammation and abscess of the salivary gland itself are extremely rare. Osteo-periostitis from diseased teeth is often confounded with cellulitis; in the former the swelling corresponds to the body and to the border of the maxilla; its tendency is toward the face and the masseter por-

tion of the cheek; the vestibule is painful and sometimes fluctuating. In adeno-cellulitis the swelling exists below the maxilla and has a tendency toward the neck. Chassaignac's subangulo-maxillary adeno-cellulitis is fixed under the angle of the jaw, and is due to the difficult eruption of the wisdom tooth.

Ludwig's acquired or infectious submaxillary angina is characterized by excessive swelling and pain; the tongue is swollen and immovable; the mouth is distended in front; there is difficulty of swallowing; it may terminate in gangrene; it often ends in death. The treatment of these abscesses consists in evacuating the pus as soon as possible; incisions should be made under and parallel with the inferior border of the maxilla, so that the cicatrices will not show; by using the method of dilatation on a guide the evacuation takes place when the exploring-needle has located the pus, and there is no cicatrix of any consequence remaining.

Retropharyngeal abscesses often point toward this region, although they may burrow down into the mediastinum; in the former case the large vessels are between the pus and the surgeon's knife. It is best to try to evacuate through the mouth, to avoid the course of the large vessels and nerves. An incision in the middle line of the pharynx, if it will accomplish the object, is preferable as safer; it is well then to place the patient in Rose's position, to prevent the entrance of pus into the larynx.

Gangrene is sometimes met with in this region as a termination of violent infectious inflammations. Scrofulous *ulcers* are not rare in children as a result of suppuration of the lymphatic glands of the region. *Fistulæ* are rather common; usually they are due to diseased teeth and to the tuberculous lymphatic glands, to salivary calculi developed in the gland itself.

Gaseous tumors are sometimes seen under the form of pharyngocele.

The liquid tumors most common are various cysts. The most frequent are the salivary cysts due to retention of the

saliva resulting from a more or less complete obstruction of the intra-buccal portion of Wharton's duct. Hydatid cysts have been observed. Cysts from cancerous degenerations are not rare.

The most common solid tumors are strumous, tuberculous, syphilitic adenoma. Cancerous adenoma is comparatively frequent; it is usually secondary to cancerous lesions of the face, mouth, or tongue. All the other tumors have been observed, but are very rare. It is very seldom that the salivary gland itself is the seat of the growth; if the saliva flows through the apex of Wharton's duct, it is not the gland that is affected. Practically it is immaterial.

Salivary calculi are peculiar to this region; they give rise to pain and swelling; sometimes abscesses are followed by fistulous openings, temporary or permanent; the calculi sometimes occupy the centre of the gland or the deep surface, and the most important symptoms, as also the fistulous openings, are in the mouth. They are diagnosticated by searching carefully for the opening of the fistula and probing it, when the peculiar click will be felt; if necessary, a needle thrust deeply through the gland in several directions will strike the calculus if it be present.

Surgical operations of the submaxillary region. Tumors should be removed through the mouth whenever possible, to avoid outside cicatrices and disfigurement. The removal of cancerous glands should be undertaken early, because they soon become adherent to the maxilla and to the deep structures, with all the following evil consequences. The structures liable to be injured in an operation in this region are the facial artery, the lingual artery, the hypoglossal nerve; the mouth may be opened.

PECULIARITIES OF THE SURGICAL DISEASES AND INJURIES OF THE PAROTID REGION.

Congenital absence of the parotid and atrophy of the gland are very rare. However, occasionally subjects are seen with

a deep hollow between the ramus of the jaw and the mastoid process, showing the partial atrophy at least of the gland.

Congenital hypertrophies are not on record. Branchial fibrochondromata are sometimes found over this region. *Acquired atrophy* or destruction of the gland has been observed as the result of neuroses, injuries, congestions (mumps), inflammations, and gangrene due to general fevers. *Acquired hypertrophies* are represented by the various kinds of swellings of the region. *Swellings* may be due to some forms of injuries or neuroses.

Injuries of the parotid region are rare; they are grave, on account of cicatricial disfigurements and injuries to the facial nerve and to Steno's duct. Punctured superficial wounds are of no consequence, nor are the deeper wounds unless the instrument be large and the great vessels be injured. Incised superficial wounds may injure the facial nerve and the duct, and may be followed by paralysis; when large the divided nerve and duct should be at once stitched. Incised deep wounds are most serious. The diagnosis of the penetration of the gland rests upon the escape of saliva. When the wound is narrow the hemorrhage, and later the suppuration, prevent the diagnosis; if the pus is very liquid, it is probable the gland is seriously injured. To prevent fistulæ, stitch tightly and procure rest of jaw. Deep wounds are more serious, because of the presence of the temporo-maxillary vein, which becomes the external jugular; also of the other deep vessels. The bleeding is profuse and sometimes terrific; it should be at once stopped by plugging; then a provisional loop ligature should be applied on the common carotid, close to the bifurcation; the bleeding points should then be ligated. If this fails, it should be determined with care which vessels furnish the hemorrhage. If the external carotid, ligate it; if the internal carotid, ligate it separately or ligate the common carotid at the very bifurcation, to prevent the return through the collateral circulation. If the jugular vein is injured, ligate it as high up as possible, at least above the facial and lingual, or ligate there. After the ligation or ligations

have been done the accidental wound should be packed tightly with bits of aseptic sponge, to prevent hemorrhage from the distal end of the vessels; this plugging will usually accomplish this, but plugging should never be relied upon if the trunk has not been ligated; the hemorrhage is almost sure to recur, and often the patient thus loses so much blood that when the ligations are at last performed the patient still succumbs to hemorrhagic anæmia. When the hemorrhages are unmistakably venous the thorough, systematic sponge plugging may suffice even in wounds of the internal jugular. *Contused and lacerated wounds* call for the same remarks, but it must be remembered that although the primary hemorrhage may not be copious, the secondary hemorrhages are most to be dreaded, and proper instruction in consequence must be given.

Gunshot-wounds call for the same remarks, with the aggravation of the presence of the ball in the deeper structures, in the pharynx, in the bones, or in the brain. *Poisoned wounds* present nothing peculiar.

Neuroses are represented by paralysis due to the injury of the facial or auriculo-temporal nerve by blows or operations in this region, or they may follow disease of the nerve or pressure upon it by products of inflammation or tumors. *Nervous hypertrophy of the parotid region* has been recorded; it is characterized by a rapid congestion of the gland in a few minutes, with a constant desire to swallow; sometimes the two glands are affected at the same time; the cause seems to be a mental excitement. It is soon dispelled under proper antispasmodic remedies.

Softenings and *indurations* present nothing special.

Hyperæmia of the parotid is here represented by the disease called *mumps*. It is considered a specific infectious disease; it is contagious in schools; it is most serious in spring, in damp or cold weather; young male children are more commonly liable; sometimes it follows orchitis, but it is usually the reverse. Its pathology is obscure. The most remarkable symptoms are pain and swelling without redness or heat, soft-

ness of the part; no induration, no fluctuation; the pain is increased by biting, chewing, swallowing; there is little or no general reaction. The beginning is often sudden, also the termination; it sometimes removes suddenly to the testicles, ovaries, or breasts. The duration is about ten days. Termination by resolution is the rule; it is altogether exceptional when suppuration takes place. The treatment consists of soothing liniments and keeping the parts warm. It may affect both sides, and also the submaxillary gland; it is sometimes epidemic; it may be due to the localization of a microbic infection coming from the mouth and following the mucous membrane of Steno's duct.

Adenitis or adeno-cellulitis of the lymphatic glands situated on the parotid gland is usually due to lesion of the scalp or face; the symptoms are not so severe, the motion of the jaw is not so painful.

Simple and non-virulent *inflammation* of the parotid may be due to cold, traumatism, obliteration of Steno's duct by a calculus, or to the presence of a calculus in the gland; to mumps, to goitre (parotid goitre), mercurial salivation, iodide of potassium, or menstruation. The symptoms are those of ordinary localized cellulitis; the pain is usually great on account of the capsule.

Acute parotiditis is a comparatively rare disease. Its causes may be mumps (rare), a debilitated state of the system, an infectious disease (typhoid fever, sepsis); it may be complicated with ear, eye, tonsil, or brain syphilis, but it is always very rare. A pathological peculiarity is that the capsule of the gland prevents the pus from coming to the surface quickly.

The symptoms are those of deep cellulitis, with the addition of the general symptoms due to the lesion which is the cause of the parotiditis. The mouth is closed; there are facial œdema, earache; the speech and deglutition are painful. The course is usually rapid; it may be sthenic or asthenic; the pus forms rapidly, almost at the very outset. The duration is about fifteen or twenty days. It terminates almost always by suppuration; the pus may open into the ear, pharynx,

vessels, down in the neck and chest, and in the space behind the pharynx; it may terminate by several successive abscesses; it may terminate also by gangrene. Its prognosis is most grave.

The treatment consists in keeping the mouth disinfected and in an early evacuation. In superficial abscesses be mindful of the course of the facial nerve and of Steno's duct; in deep suppurations, of the external carotid; in these cases follow Hilton's method or dilatation upon a guide. The complications are extensive dissection of pus, hemorrhages from ulceration of large vessels, venous thrombosis of facial, external, and internal jugulars, of cavernous sinuses. Its sequelæ are cicatrices, fistulæ, paralysis of facial nerve, parotidean ephidrosis. The forms and varieties are: deep parotiditis, with abscess opening in the pharynx; purulent catarrhal inflammation of the gland; multiple abscess, lobular abscesses, having to be each opened separately; diffuse parotido-cellulitis.

Gangrene of the parotid region may follow injuries and inflammations; its usual sequels are salivary fistulæ or paralysis of the facial nerve.

Ulcers of this region present nothing peculiar except that they may be followed by fistulæ.

Fistulæ of the parotid are not very common. The causes are abscesses, furuncles, carbuncles, gangrene, ulceration, operations, and diseases due to calculi developed in Steno's duct or in the gland itself, or abscesses due to microbic infection, or from any other cause. The symptoms are an orifice through which the saliva runs, increasing during mastication and meals; it is increased by lemon, salt, vinegar; the orifice is usually single, is situated on the centre of an ulcerated fungosity; it may be small or large; a probe penetrates more or less deeply. They sometimes cure spontaneously, but the prognosis is generally bad, because they are often difficult to cure. The treatment consists in local cauterization; if this is insufficient, in making a large hole in the region and closing the surface-opening by a plastic operation; in persistent cases

in destroying the parotid. The forms and varieties are: multiple capillary salivary fistulæ; they are also called ephidroses; they are caused by obliteration of the duct or traumatism or loss of substance; they are characterized by a sort of transudation through the skin of the region of the parotid of a transparent liquid which forms numerous drops at the time of meals.

Tumors of the parotid. The lymphatic nodes, situated on the parotid, may present almost all the tumors that develop in the salivary gland; they are called supraparotid tumors; they are usually movable, whereas the tumors developed in the parotid gland are not. Gaseous tumors of the parotid region do not exist. Liquid tumors, such as liquid hæmatoma, angioma, varix, present nothing peculiar; aneurisms are almost unknown; lymphangiomata of the parotid are congenital cysts and show after birth. Glandular angioma of the parotid is usually called glandular hypertrophy; it usually shows at birth; the skin is sometimes bluish; it has been observed only in children; perhaps they change with age. Salivary cysts due to the obliteration of a duct of the gland may be followed by fistulæ if treated by mere outside incision; it is best to try to open them from the inside of the mouth. Mucous, mucoid, serous, and dermoid cysts are rare; they present nothing peculiar. Hydatid cysts have been reported. Purulent cysts or chronic abscesses are not common; tuberculous abscess of the parotid gland itself has never been observed (Duplay), but in the lymphatic glands they are common enough proportionately. Solid tumors of the parotid may be of all the varieties elsewhere found. Hæmatoma, sebaceous cysts, dermoid cysts, and keloid present nothing peculiar. Simple adenomata or lymphadenomata of the parotid itself (due to simple hypertrophy) are very rare; those developed in the interlobular tissue are also rare; at first their growth is slow, then rapid, and may be generalized; those developed in the lymphatic glands are common. Adenoma of Hogdkin's disease is very rare here. Strumous adneoma presents nothing peculiar. Tuberculous adenoma

has never been observed in the parotid gland itself; in the lymphatic gland it is comparatively common, especially in children; it may at the onset simulate a tumor of the parotid gland and later a salivary cyst. Syphilitic adenoma of the parotid and gumma of the parotid are doubtful. Syphilitic adenomas of the lymphatics are common in syphilis. Adenoma of the gland is rare. Lipoma may be circumscribed or diffused and infiltrate between the acini and the lobules of the gland.

Fibroma has been observed. Myxoma also presents a gelatinous aspect. Myomata are very rare. Neuroma is doubtful. Chondroma forms 30 per cent. of the tumors of the region. Sarcoma, together with fibroma and cystoma, is about equally often present. Carcinomata represent about 45 per cent. of all the tumors of the parotid region; usually they are mixed tumors, in which the epithelial element has taken a great development; they may be secondary to similar tumors originating in the pharynx or on the face; primary carcinoma is rare. Encephaloid develops at forty-one, on the average. Pulsatory encephaloids are very rare. Melanotic cancer is very rare; it usually involves the lymphatics. Scirrhus usually develops at sixty or seventy. Mixed tumors are commonly those called simply chondromata; they usually remain limited to the parotid and do not invade the other regions; they may become very large, so as to affect mastication; some have a rapid course, some a slow one; they may degenerate into sarcomata; they return rarely if operated upon in the first period; they return often if operated upon in the second period; generalization is very rare.

Tumors special to the parotid region are represented by the salivary calculi developed in the parotid; they are rare in the gland itself; they are said to be more frequent in males and in adults, also to be due to the inflammation of the duct-radicles, which retards the flow of the saliva; also to changes in the chemic composition of the saliva. They usually cause pain, inflammation, and an abscess, which, upon opening, leaves a salivary fistula; using the probe through the open-

ing or by penetrating the gland deeply with a needle, the calculus is felt; they may cause atrophy of the gland by sclerosis. They should be removed through an incision.

Surgical operations of the parotid region. The possibility of extirpating the whole parotid has been much discussed, but it presents no practical or clinical importance; when the gland is diseased the disease must be removed, whether it affects the whole gland or not. A partial disease of the gland with prolongations is as bad as, if not worse than, a disease affecting the whole gland without such processes. The dissection should proceed from below and behind, upward and forward; the external carotid should be located and ligated or clamped, otherwise it might be cut several times; when the dissection leads into the deep parts the patient's mouth should be opened, as this increases the size of the parotid cavity and renders the deep dissection easier by affording more room. A previous permanent ligation of the external carotid might be done, or a provisional loop ligature applied to the bifurcation, so that if it should become necessary to ligate the internal carotid the same incision will answer for all purposes. In penetrating the region the dangerous structures are at the entrance and in front, to the inner side of the head and neck of the condyle; more deeply they are on the posterior wall. Some tumors of considerable size, and sometimes extending to the pharynx, are removed with little difficulty and little hemorrhage if the adhesions are loose; whereas adherent tumors, even of small size, are fraught with danger. The safe plan is to proceed as long as the adhesions with the surrounding structures are easily broken, and to stop as soon as they become too resistent and as we approach the deep, dangerous structures which may be adherent to the tumor; then the cleared part of the tumor should be cut off. It is a remarkable fact that often the stump left will, in growing again, become more superficial, and it is sometimes possible to remove the stump entirely by a second operation.

PECULIARITIES OF THE SURGICAL DISEASES AND INJURIES OF THE LATERAL REGION OF THE NECK OR OF THE STERNO-MASTOID REGION OR CAROTID REGION.

Congenital malformations are represented in this region by the orifices of the branchial fistulæ, situated most commonly along the lower part of the anterior border of the sterno-mastoid; also by the congenital deformity of the sterno-mastoid, called hæmatoma of the sterno-mastoid, and congenital torticollis; also by the congenital atrophy of the same muscle. *Acquired malformations* comprise the various forms and varieties of torticollis and the deformities due to cicatrices. Cicatrices of the neck are most objectionable, especially when affecting the exposed parts.

Swellings of the region recognize the same causes, and present the same forms and varieties as anywhere else.

Burns or frost-bites present no peculiarity in the region of the sterno-mastoid, except when deep and reaching the sterno-mastoid or the underlying vessels and nerves.

Contusions or blows on the neck are always severe, but when striking the side of the neck over the jugular they are particularly severe and are comparatively frequent; they may cause a hæmatoma in the sheath of the muscle; they may cause paralysis or contracture of the muscle, producing a variety of torticollis; the muscle is sometimes ruptured, also the vessels and the nerves; these have a train of symptoms which will be described further on.

Non-penetrating *wounds—i.e.*, not extending deeper than the muscles and glands—are not serious unless through becoming infected. Penetrating punctured wounds of the neck may be deep without injuring the vessels and nerves, owing to the elasticity and mobility of the jugulo-carotid vessels. Penetrating wounds of the external jugular, of the internal jugular, and the carotid arteries are more serious injuries. They all may give rise to circumscribed or diffused hæmatoma. When this is of some size and stationary it must be aspirated or incised. When it pulsates and grows it is be-

cause a traumatic aneurism has formed and the wounded vessel, vein, or artery must be ligated above and below the injured point. When the penetration is comparatively small the sac may be incised at once, after making as good a pressure above and below as possible. When the puncture is large and there is risk of the patient bleeding much before the proper ligatures are secured, a provisional loop ligature must be applied below the wounded point. When the wound or the swelling is very low down, enough of the sternum must be resected to reach the root of the carotid and the innominate, and apply there the provisional loop ligature. Considering the gravity of a possible terrific hemorrhage, this advice is not too heroic: never ligate the common or the internal carotid unless it is the wounded artery, because of the possible effects on the cerebral circulation. It is only when the persistent search for the wounded point of the vessel has not succeeded that the vessel itself should be ligated in continuity below; if possible, a ligature above whenever applicable should be applied to guard against recurrent distal hemorrhage. We must bear in mind that arterio-venous aneurisms often follow punctured wounds which have gone through the vein and the artery. Wounds of the vertebral artery in this part of the neck are more common in the canal of the transverse process. At the base of the neck the wounds of the vertebral are more grave than those of the carotid.

The diagnosis of this wound will be made only when upon cutting down through the extravasated blood it is found that the carotid artery and the jugular vein are intact. Then, when the hemorrhage is profuse, it should be stopped by plugging with the finger or by packing, and a loop ligature should be applied on the subclavian or the innominate before proceeding further; when the wound in the vertebral is located it should be tied above and below; if necessary, the transverse process should be cut away with the bone-nippers. These remarks apply also to the wounds of the deep cervical, the inferior thyroid, the superior thyroid, the lingual, and the pharyngeal.

Punctured penetrating wounds of the base of the neck are almost all fatal on account of the difficulty of reaching the artery without fatal hemorrhage. Punctured wounds of the nerves of the region (recurrent, phrenic, pneumogastric, sympathetic, spinal accessory, cervical plexus) give rise to the symptoms of irritation of the nerves.

Non-penetrating incised wounds are only serious if the external jugular vein has been injured, because air may then penetrate into the veins. When the edges of the wounds lose their parallelism these may form a considerable hæmatoma. Incised wounds penetrating the sterno-mastoid and severing it incompletely are not so very serious.

Wounds dividing the sterno-mastoid muscle may curtail power of the muscle from lengthening, due to the cicatrization. When the muscle has been completely severed and the head is still it is sometimes brusquely thrown to the other side by the contraction of the intact sterno-mastoid. In case of division of the muscle from operation this does not take place, because the other muscles have gradually become accustomed by the presence of the tumor to keep the head properly balanced. The severed ends must be strongly and closely stitched with strong catgut and the head kept in proper position by a liquid glass bandage.

Incised penetrating wounds of the internal jugular are perhaps more serious than the wounds of the carotid, because of the danger of penetration of the air. When the respiration becomes embarrassed the hemorrhage increases, just as in tracheotomy, where, as soon as the tube is introduced, the hemorrhage ceases. These wounds are oftenest tearing wounds during the removal of tumors. Whatever be the cause, if the vein alone is wounded the blood is black and flows continuously. The first thing to do is to plug the opening, to prevent the penetration of air; then make pressure above and below with the fingers, enlarge the wound, and fill it with boiled water, to prevent the possible penetration of air; then look for the wounded vein and ligate both

ends. The proximal end is the most dangerous, because of the penetration of air and of the abundance of blood coming from the heart. When the compressing fingers are in the way or if their pressure is ineffectual, a provisional loop ligature should be placed around the internal jugular until the wounded ends are ligated. When the wound is low down it may be necessary to resect the sternum and place a provisional ligature around the innominate vein or the superior cava. Incised wounds of the superior thyroid, lingual, and facial veins close to the internal jugular are almost as severe.

Incised penetrating wounds of the carotids give rise to profuse, even terrific, hemorrhage. When the wound is large or when the hemorrhage is moderate, but not at once attended to on the spot, it may be immediately fatal. A man will thus bleed to death in four minutes from the carotid, it is said. When the larynx or trachea is wounded the blood penetrating into them causes death also from suffocation. The hemorrhage is sometimes stopped by fainting if the wound is not too large. Upon reaching such a case the first thing to be done is to plug the wound with the fingers or to pack it quickly. Packing will stop the hemorrhage temporarily if the vessel is of any size above one-sixteenth of an inch. It is best and safest to enlarge the wound and attempt to ligate the two ends in the wound; if this causes too much bleeding, a loop ligature must be applied, as above described. If the bleeding has stopped of itself, it must be borne in mind that it will almost surely return, and that it may do so when proper surgical assistance cannot be procured and the patient may bleed to death; therefore, the case should be treated as described above for punctured wounds. Incised penetrating wounds of the root of the neck are almost all fatal on the spot. The same remarks as above apply here. It is sometimes difficult to recognize which vessel of the neck has been divided; spurting, however, is characteristic of arterial lesion, but the vein may be divided at the same time. When the vein and artery are simultaneously wounded

ligate ends of both. In all cases where clamping stops the bleeding and a ligature cannot be well substituted the clamp should be left in place thirty-six to forty-eight hours.

Punctured wounds of the nerves of the region (recurrent, phrenic, pneumogastric, sympathetic, spinal accessory, cervical plexus) give rise to the symptoms of irritation of those nerves. Incised wounds of the nerves of the region (recurrent, phrenic, pneumogastric, sympathetic, spinal accessory, cervical plexus) are followed by the following symptoms: when the recurrent is wounded there is aphasia more or less complete. The section of the phrenic and pneumogastric on one side only is accompanied by respiratory and circulatory irregularities; they are not necessarily fatal, but it is a most serious complication. Park has shown that only about 50 per cent. of these cases are fatal. Complete wounds of the sympathetic are followed by atresia of the pupil, slight ptosis, congestion of the conjunctiva, headache, congestion of the side of the face (unless only stimulated); it produces mydriasis, pallor of face, protrusion of eyeball. Injury of the superior laryngeal nerve is sometimes very serious. When possible the divided ends must be sutured with fine silk.

Penetrating or deep contused and lacerated wounds of the region do not expose so much to primary hemorrhage, but the suturing of the muscles, the ligation of the vessels, and the stitching of the nerves cannot be relied upon as safely, because of the sloughing which usually follows those wounds; for the same reason secondary hemorrhages are much more common and more grave. Penetrating or deep gunshot-wounds of the region call for the same remarks plus the frequent penetration of the digestive and respiratory tracts and spinal canal with their possible complications; the presence of a ball or foreign bodies deeply lodged and irremovable in these wounds injures the vessels more frequently and seriously than the deep punctured wounds. Here less than anywhere else should search be made for the bullet. When, however, the wound is large the finger may be introduced, and if the ball is felt it should be removed.

Poisoned wounds, stings, bites, etc., present nothing peculiar in this region.

Foreign bodies, represented by bullets particularly, may remain imbedded in the tissues without giving rise to any serious trouble; a bullet may thus remain in contact with the large vessels without causing trouble, but not so with the nerves.

Rupture of the sterno-mastoid is the most common rupture of all the muscles ruptured; it has taken place after falls, sudden twists, violent muscular contractions. There is great pain, a depression in the course of the muscle, great hæmatoma; the head is often twisted by the action of the other muscles. The treatment consists in placing the head in proper position and immobilizing it in a liquid glass bandage. The rupture is usually partial; when complete the ends are far apart; it is well to cut down and stitch; otherwise a kind of torticollis may result from lengthening of the muscle.

Neuroses are represented by the disease known as torticollis.

TORTICOLLIS.

Torticollis, also called wry-neck, is a deformity of the head and neck in which the face is turned upward and to one side. It is not a very rare disease. The causes are numerous, and will be studied with the forms, varieties, and complications. The pathological lesions vary also with the causes. The symptoms are the deviations mentioned above, accompanied by other lesions according to the forms and varieties. There is also atrophy of the face and cranium of the affected side; sometimes strabismus, impairment of vision, dysphagia. There are usually no general symptoms. The course, duration, diagnosis, prognosis, and treatment all vary with the forms, varieties, and complications.

Acute, transient, or rheumatic torticollis is that due to cold; it presents no cranio-facial deformity; it may affect the sterno-mastoid, the trapezius, or all the muscles of one side. The peculiar point in the treatment is to immobilize the head in a liquid glass bandage for a few days.

Chronic torticollis comprises all the following forms and varieties:

Intermittent or spasmodic torticollis is characterized by a sort of convulsive to-and-fro movement of the head, with cessation for short intervals or during sleep. The name is a bad one, because there is no spasm, but simply a loss of dynamic action, a lack of muscular synergy. The head is easily restored to its proper position, but it returns to the vicious one; the muscles behind and in front are of the same consistency on both sides; the contractions are clonic spasms returning by attacks more or less frequent, followed sometimes by a more or less lasting contraction; this may become permanent; it is then called tonico-clonic. The spasms are limited to the sterno-mastoid, trapezius, and splenius; when the patient is lying down with the head flat there is no deviation; when sitting up the head loses its equilibrium; it is first inclined laterally, and then in rotation; the movements are slow, gradual, without jerks. The head is easily straightened by an assistant, but it falls back immediately when the support is withdrawn. Electricity and massage are the most usual means employed, together with a collar apparatus; stretching or section of the spinal nerve has been done in one case with only temporary improvement.

Permanent torticollis may be cutaneous and cicatricial, muscular or articular, or osseous; the muscular may affect the lateral muscles (sterno-mastoid, platysma, scalenes), or the posterior muscles (trapezius, rhomboid); the latter will be described with the diseases of the posterior region of the neck. Torticollis may be hysteric or may be simulated or affected (dude's torticollis). Torticollis due to affections of the sterno-mastoid is by far the most frequent; it may be due to retraction or to paralysis.

Cutaneous or cicatricial torticollis is easily recognized; the head is not twisted as in the regular torticollis.

In articular or osseous torticollis due to tuberculous osteo-arthritis, and in that due to tumors, the head cannot be budged

from its absolute immobility on the vertebral column; the head is not twisted as in the real torticollis.

In torticollis by contraction the head can be straightened; the muscle retains its shape and its contractility; it is the trapezius that is most commonly affected.

In torticollis by retraction the head cannot be thoroughly straightened, and there is the persistence of a hard-stretched muscular cord. Sometimes it requires the administration of an anæsthetic to determine those points and whether it is the sterno-mastoid or the trapezius which is affected, or the deep muscles. Torticollis by retraction of the sterno-mastoid is also called torticollis by contraction, meaning a permanent strong contraction and retraction of the muscle. It is the most common; it is characterized by a hard, stretched cord along the course of the sterno-mastoid, especially when the head is rotated in a proper manner. That it may be congenital is recognized, but it is rare; it is sometimes called obstetric when it is thought to be due to the traumatism produced by the forceps; it may be due to myositis syphilitica or to a gumma. It is called physiological when it is due to vicious attitudes, voluntary or involuntary; or it may be due to disease of the central nervous system or to the nerves of the muscle; or it is called ocular when induced by defects of vision—*i.e.*, headache, diplopia, astigmatism, amblyopia. It is sterno-clavicular torticollis when it affects only that head of the muscle, or double-headed when it affects the two heads; the sternal head is the most commonly affected. The pathological lesions are a fibrous degeneration or transformation of the muscle; it usually occupies the lower two-thirds; the right side is more frequently affected. Cranio-facial atrophy is due to defective nutrition of the parts. The prognosis is that the deformity always tends to increase.

The treatment consists in performing tenotomy, subcutaneously or openly, of the affected head or of the two heads; the best time to operate is not before the third or fourth year. The disease has no influence on the development of

the skeleton up to that age; after the tenotomy a proper collar apparatus, with or without suspension, must be used.

In permanent paralytic torticollis the head is inclined to the opposite side of the hemiplegia, due to the action of the sterno-mastoid of the opposite side; it may in the course of time bring on a retraction of that muscle. No other form of paralytic torticollis is recognized by most writers. The head can be straightened and remains so only as long as it is supported. The treatment presents nothing special except to apply also a supporting apparatus.

Torticollis of the platysma has been observed; also of the scaleni. Hysteric torticollis is diagnosticated by anæsthesia; also the simulated torticollis and the affected torticollis of the dudes; in these last cases the two sterno-mastoids are simultaneously contracted.

Induration of the sterno-mastoid in the newborn will be described with hæmatomata. Induration of the muscles in adults is syphilitic; it may be diffused sclero-myositis; it may occupy the whole muscle, which is transformed into a cord, or it may be localized in one spot.

Congestion or hyperæmia of the region of the sterno-mastoid presents no peculiarity.

Inflammations of the side of the neck are comparatively frequent. They present peculiarities in almost all of the tissues of the region.

Inflammations of the skin and subcutaneous connective tissue, however, present no peculiarities not already described with the neck in general.

The external jugular vein is sometimes affected with phlebitis, recognizable by the long, hard cord in its course, with pain, etc. The sterno-mastoid muscle itself is seldom inflamed (sterno-mastoid myositis) except in acute rheumatic torticollis due to cold or sprains of the muscle; the muscle may be destroyed in cases of abscess developed in the sheath; when the muscle itself is inflamed and suppurates it is in one of the general infectious diseases.

Inflammations in the sheath of the sterno-mastoid are com-

mon; sometimes they begin in one of the small lymph-nodes situated in the sheath itself; when originating from these it is remarkable that the inflammation and the pus that usually follows it remain limited to the sheath very strictly, and descend toward the lower third of it, near the clavicular attachment, where they become superficial. This inflammation leaves after it a stiffness and a shortening of the muscle.

Acute cervical adenitis and adeno-cellulitis or adeno-phlegmons are the most common of all the forms of inflammation of the neck.

Diffuse cellulitis is usually due to the fact that although probably originating in the glands from some infectious products, in angina, scarlatina, etc., conveyed from the face, neck, mouth, pharynx, œsophagus, larynx, or trachea, it quickly spreads into the surrounding connective tissue and forms those grave cases of diffuse cellulitis which spread all around and become very extensive, already described above, where the pus may burrow in all directions, as also said above.

Phlebitis of the internal jugular vein is not very common; it is usually due to infection from the interior cavities or to metastasis. It is accompanied with great pain and swelling along the course of the vein; it is often complicated with phlebitis of the lateral sinus and with cerebral symptoms. It is diagnosticated with the exploring-needle; it is of the utmost importance to diagnosticate early and to evacuate early by incision or dilatation on a guide.

Arteritis presents no peculiarity.

Neuritis of the nerves of the region is most uncommon.

Chronic inflammation of the glands, or chronic cervical adenitis, is most common; it is usually strumous or tuberculous. Chronic inflammation of the other tissues of the region is most rare.

Gangrene presents no peculiarity.

Ulcers are usually strumous or tuberculous or cancerous from the ulceration of the lymphatic glands; they leave ugly scars.

Fistulæ of the region are sometimes congenital branchial; but they almost always are due to the tuberculous glands.

Gaseous tumors of the lateral region may be pharyngocele, œsophagocele, laryngocele, tracheocele, and emphysema; they present nothing peculiar here.

Liquid tumors containing blood are all represented here. Hæmatoma due to contusions, to ruptures of the sterno-mastoid, to narrow, penetrating wounds of the vessels, when they are persistent should be aspirated, but not until full time has been allowed for resorption. Varix or dilatation of the external jugular vein is usually due to heart-disease; it requires no treatment. Varix or dilatation of the internal jugular also.

Angioma of the neck is sometimes called sanguineous cyst. It must not be confounded with a cyst in which hemorrhages have taken place or have opened into a cavity; they may be superficial or deep or cavernous. Angioma sometimes presents a single vein opening into the jugular by one or several orifices; sometimes several angiomata open into the jugular. The neck is a special seat of ampullar venous dilatations, forming cavities in an erectile tissue with narrow spaces. Angioma is often completely reducible. In operating it is advisable to place a ligature on the large vessels as soon as possible before extirpating the tumor, thereby diminishing very much the hemorrhage during the removal and facilitating the removal. A sanguineous cyst is sometimes due to a serous cyst with a hemorrhage in its cavity. A sanguineous cyst is also a cyst which originally was serous and has opened into a vessel, usually a vein. Sometimes a sanguineous cyst is found completely isolated and closed in the course of absent veins; other sanguineous cysts are either an angioma developed in the walls of the jugular or due to venous dilatations or varices of the jugular. We do not consider as sanguineous cysts those cysts formed by an encysted hæmatoma, by a sarcoma with a cystic degeneration and hemorrhage in its cavity, nor of central cysts developed in the lymphatic glands, or hemorrhage in cystic tumors or serous bursæ.

Aneurisms of the neck may affect the three carotids, or their branches—*i.e.*, the superior thyroid, lingual, and facial; but these are rare. They may also spring from the first and second portions of the subclavian or its branches, especially the vertebral, then the inferior thyroid, deep cervical; but the last two are most rare.

Clinically and practically the aneurisms of the neck form two groups: the aneurism of the root—*i.e.*, situated low down, nearer the clavicle and sternum; they should be treated as detailed above in the infrahyoid region. The following are the diagnostic signs of the seat of the aneurism: increase in the retardation of the right radial pulse is a constant sign of innominate aneurism. In aneurism of the ascending arch the inequality of amplitude of the two radial pulses is frequent. It exists only on the right side in innominate aneurism. The increased retardation of the pulse exists simultaneously in the radial in subclavian aneurisms. Increased retardation of the temporal pulse characterizes carotid aneurisms. We should not take an arterial dilatation of the whole artery for an aneurism. Spontaneous aneurism is exceptional.

The aneurisms above the root are those where there is room to penetrate between the tumor and the arch. They are aneurisms of the carotids and branches and of the vertebral.

The aneurisms of the carotids are seldom traumatic; however, they may be the result of contusions. The common carotid is more frequently affected (18 per cent.); it is comparatively frequent in females, more so surely than the other aneurisms; it is also more common in young subjects than the aneurisms of other arteries. These aneurisms may be confounded with vascular or aneurismal goitres, pulsatile, sanguineous cysts of the thyroid when they exist in the course of the carotids; also with pulsatile encephaloid; also with other tumors of the neck situated in the course of these carotids.

The treatment of aneurisms of the carotids by the methods of Anel gave 22 per cent. mortality; the special complications

being cerebral anæmia, thrombosis, softening, ocular symptoms, laryngeal and pulmonary troubles. Incision of the sac without previous ligation is most dangerous. Ligation below and then incision of the sac gave 100 per cent. cures. In regard to ligation both below and above and then incising the sac, we have no data, because usually after ligating below and incising the upper end is also secured. Extirpation has never been done on this artery; but it should be, unless the sac be very large and closely adherent to the important vessels and nerves.

Aneurisms of the external carotid have been most frequently treated by ligation of the common carotid, with twelve cases and two deaths. The external carotid itself has been ligated in three cases, with one death and one return. The sac has been extirpated once with success. Aneurisms of the internal carotid—*i.e.*, of the extracranial portion—often project into the pharynx; ligation has been performed seven times, with only one recovery.

Arterio-venous or jugulo-carotid aneurisms require no treatment unless they grow and cause grave pressure-symptoms. Then the artery and the vein should each be tied above and below and the sac incised, or, better, extirpated, because if left in place it may still cause trouble by pressure-symptoms. This has been done in this region. Arterio-venous aneurism of the external carotid presents three cases on record; in two the ligature was applied above and below, with one death. Arterio-venous aneurisms of the internal carotid—*i. e.*, the extracranial portion—have two cases on record; no operation was performed; both died.

The diagnosis of the affected artery in cervical aneurisms, etc., is often most difficult. Clinically and practically the diagnosis is made by operation. A provisional ligature should be applied below the tumor. When this stops the pulsations another ligature should be placed above; if this is not possible, the ligature below should be tightened, the sac incised, the upper end of the artery secured, and the bleeding points, if any, clamped, and the sac extirpated if not too

closely adherent to the important vessels and nerves. When, after placing the loop ligature, the pulsations are not affected, it is because the wrong artery is attacked; the loop should still be kept in place and the vertebral should have a loop ligature under it, when the pulsations will stop; then another ligature should be placed above, if possible, and as described for the carotid. Lymphangioma of the region presents no peculiarities.

Serous congenital cysts of the neck are most frequently situated in the lateral region of the neck; they are usually seen at birth; the multilocular cysts specially occupy this lateral region, whereas the unilateral occupy more frequently the median line, but there are many exceptions. Serous acquired or post-natal cysts of this region are really congenital cysts. We will only mention the following, which are not truly cysts: sanguineous cysts, due to contusions, which are hæmatomata; sanguineous cysts due to sarcoma with an internal hemorrhage. Mucous, mucoid, dermoid cysts are all congenital cysts and present no peculiarities not already mentioned with the cysts of the neck in general. Hydatid cysts of this region are very rare; sixteen cases in all. Cystic degeneration of glands and tumors are not described as cysts. Purulent cysts, or chronic abscesses, or abscesses by congestion are sometimes observed in the sheath or the sterno-mastoid. We do not consider softened tuberculous glands as cysts. Chronic abscesses are most frequently situated in the sheath of the large vessels, whence the pus may pass down into the mediastinum.

The solid tumors of the lateral region are: hæmatomata, clotted or solidified, from contusion. They have been observed also from rupture of muscles and injuries of bloodvessels. Senn had a most interesting case of persistent solidified aneurism of the common carotid. Hæmatoma of the sterno-mastoid in the newborn is most remarkable and unique. It usually appears after birth; it is more frequently on the right; it occupies the body of the sterno-mastoid, partially or totally forming a part of its substance; it is firm, elastic; it is oval;

it is stationary; there is no pain except on pressure; the head is inclined as in torticollis; there is no tendency to grow nor to suppurate; it usually disappears by resolution in a few weeks or months. It is thought to be due to obstetric traumatism or a malformation; it is common after breech presentation when traction has been made to extract the head; it may cause a permanent torticollis. It must not be confounded with enlarged glands.

Induration of the sterno-mastoid in adults is syphilitic; it may be a diffused sclero-myositis; it may occupy the whole muscle, which is transformed into a cord, or it may be localized in one spot.

Gummata of the sterno-mastoid are found usually at the inferior insertion of the muscle; they may attain the size of an orange. This muscle is a point of election of gummata; they develop rapidly, in four weeks, without traumatism and without trace of pain. One case of hereditary syphilis of the sterno-mastoid is reported.

In connection with adenomata of the lateral region we will note here that tumors of the lateral region of the neck are usually glandular; a median tumor is most commonly connected with the thyroid body, larynx, or trachea. Simple adenoma or lymphadenoma or pure hypertrophy of the gland is rare. In some cases of anæmia there are peculiar hard glands of stony hardness, commonly unilateral, usually affecting the whole set of the glands (Miller). Adenoma of Hodgkin's disease, or adenia or adenoma of leucocythæmia, very commonly begins by the neck; in leucocythæmia there is increase of white blood-corpuscles; in adenia there is no increase. Strumous adenoma is very common in this region. Senile scrofula is represented by strumous adenomata in old people. Tuberculous adenoma is most common here; it is almost a seat of predilection. Syphilitic adenomas are very frequent also; next to the nucha it is the part of the body most frequently presenting the symptoms of chronic syphilis; the glands are usually painless, of the size of a hazelnut, indurated; they never suppurate. Adenoma of glanders pre-

sents no peculiarities. Lipoma in this region presents no peculiarity not already mentioned in the description of the diseases of the neck in general; however, we must bear in mind that they often adhere to the vessels and bones. Fibroma is rare. Myxoma and myoma present no peculiarities. Neuromata of superficial nerves are cutaneous, plexiform; they are common in the neck, but not more frequently so in the lateral region. Chondroma is more commonly found as originating in the glands; they often adhere to the sheath of the vessels and to the bones. Osteoma has not been observed except as a possible calcareous degeneration or ossification of some structures. Encephaloid, melanotic, colloid, or pulsating; sarcoma, epithelioma, carcinoma, and scirrhus are almost always secondary to such diseases of the head, face, pharynx, œsophagus, larynx, or trachea.

Tumors special to the region. The hæmatoma of the newborn is the only tumor special to this region.

Surgical operations of the lateral region of the neck or region of the sterno-mastoid and of the carotids. The only operation requiring particular mention is that of tenotomy for torticollis, when the innominate vein may be wounded.

PECULIARITIES OF THE SURGICAL DISEASES AND INJURIES OF THE SUPRA-CLAVICULAR REGION.

Congenital atrophic malformations. A sort of atrophy of the region is presented in subjects, young and old, in which the supra-clavicular fossa is unusually deep, causing the deformity called "salt-cellar neck." Orifices of congenital branchial fistulæ are sometimes met with in this region.

Acquired atrophies call for no special remarks. As for *hypertrophic malformations*, it sometimes happens that carriers, especially plank-carriers, develop a thickening of the skin and connective tissue of the region, called a pad. In emphysema the hollow of the region is filled by the apex of the lung; also in pneumatocele; also in aneurisms and other tumors.

Swellings of the region are rather frequent, but present nothing peculiar, except what has been said.

Burns or frost-bites are rare, as the region is usually well protected.

Contusions sometimes present hæmatomata so large as to painfully compress the branches of the brachial plexus. In fractures of the clavicle the brachial plexus may be injured.

Punctured superficial *wounds* may open the external jugular, the terminal part of the external and anterior jugulars, and of the cephalic, but they are seldom serious unless infected. Punctured wounds of the subclavian vein and artery may also give rise to serious hæmatomata. When persistent they should be aspirated or incised. We should bear in mind that hæmatoma may be due to a wound of the vein, and that the connection may still exist. This will surely be the case if, after aspiration, it fills up again. In case of incision the deeper clots should not be disturbed, so as not to open the wound in the vein in case that lesion has occurred.

Injury to the subclavian artery is recognized by the pulsations of the hæmatoma; it is then a traumatic aneurism. The artery should be ligated. When the swelling is moderate the ligation should be made in the supra-clavicular region, using, if necessary, an aneurismal needle with a detachable point. In the majority of cases this simple ligation will suffice to cure the aneurism; if not, compression of the axillary or its ligation should also be done; then the sac incised and the injured points ligated above and below. When on the right side, the artery can only be reached and encircled in its second portion after dividing the anterior scalene; no permanent ligature should be applied there; a provisional loop ligature should be placed, the sac incised, and the injured point of the third portion ligated permanently above and below. On the left side the ligation of the second portion can be made permanent at once, as it is as safe on this side as a permanent ligature is unsafe on the second portion of the right side. When the swelling is so great as to cause the

failure of the above procedure, or so as to discourage even the attempt, but only then, a provisional ligature should be applied upon the first portion of the subclavian; the axillary should be compressed or treated in the same way, then the sac is incised and the two ends ligated. In some cases these ends cannot be found; packing with bits of aseptic sponge should then be resorted to, with compression over it. Should the hemorrhage return, the clavicle should be sawed through and the two ends secured. When the artery on the right side is wounded close to the scalene, so as to compel ligation of the second portion, this should be done with double catgut, without rupturing the coats and with a bloodless space between the ligatures. On the left side the second portion can be ligated with safety after the old method; but the new method should be applied there also in preference. The permanent ligation of the first portion on either side should not be done unless it can be done thoroughly with double catgut, without rupturing the coats and with a bloodless space between. As this cannot be safely done, as a rule, without resecting a part of the inner extremity of the clavicle and the corresponding part of the sternum, this should only be done when the ligation of the second portion cannot be performed satisfactorily, as above described. Arterio-venous aneurism, due to punctured wounds of both the vein and artery simultaneously, should not be interfered with unless they grow or cause serious pressure-symptoms; then both the artery and the veins should be ligated above and below and the sac extirpated, unless too adherent to surrounding structures; if left in place, it should be incised to diminish its pressure-effects; sometimes these continue, although abated.

Punctured wounds of the nerves rarely cause paralysis, but may cause persistent pain, neuralgia, and trophic changes in the area of distribution.

Punctured wounds of the lymphatic duct on the right and of the thoracic duct on the left may produce a chyloma, which should be treated as a venous hæmatoma; usually it is only then that it is recognized.

Punctured wounds of the apex of the lung may be followed by emphysema, at first limited and then generalized.

Incised superficial wounds are not serious unless infected. The wounding of the external and interior jugulars and of the cephalic is easily arrested; however, the wounding of these veins, near their point of discharge into the subclavian, may be followed by severe hemorrhage and by entrance of air into the veins.

Incised wounds of the third portion of the subclavian artery, when large, are followed by rapid death; when smaller they often cause traumatic aneurisms; the treatment is the same as indicated for punctured penetrating wounds. Incised wounds of the subclavian vein are most serious because of the amount of bleeding, often causing rapid death, and also because of the quick penetration of air into the vein. The vein should be at once plugged with the finger, or, better, an aseptic packing; then an attempt should be made to enlarge the wound and to clamp it and then ligate the two ends. When this is impossible a provisional loop ligature should be applied on the first portion of the vein; also compression should be made on the axilla and the two ends ligated; the ligation of the proximal end is to secure against hemorrhage and also entrance of air, but the ligation also of the distal end is, of course, indispensable.

Incised wounds of the lymphatic duct on the right side and of the thoracic duct on the left are diagnosticated by the oozing of the peculiar fluid they contain. If possible, the distal end should be ligated, and this usually stops the flow, since there is a valve on the proximal end. There is seldom, if ever, any discharge from it. When ligation is impossible compression will often suffice. It is very seldom that any further trouble is noticed, because there exist usually two or three branches of that duct, and the uninjured ones carry on the circulation. When this fails and a chyle fistula is established, then the patient loses flesh and succumbs.

Incised wounds of the brachial plexus are followed by paralysis of the affected area; they should be stitched at

once. The lesions, from whatever cause, may affect only one branch. Those neuroses never affect the internal, anterior, and posterior surfaces of the arm, because these are supplied by the anastomoses of the intercostal filaments with the internal brachial cutaneous. They must not be confounded with the anæsthesia and paralysis resulting from contusions of the shoulder in hysteric subjects (hystero-traumatism). The treatment is by electricity. If a callus includes a nerve, it must be resected.

Incised wounds of the phrenic nerve are most serious. However, when the nerve has been pressed upon by a tumor for some time the wounding of it is not so dangerous. Incised wounds of the apex of the lungs are not so apt to be followed by emphysema as the punctured wounds.

Contused and lacerated wounds are much more serious than clean wounds, because of the impossibility of primary union and because they expose more to secondary hemorrhage. Gunshot-wounds also are serious for similar reasons.

Poisoned wounds, stings, bites, present no peculiarities here, nor do foreign bodies in wounds of this region.

Dislocations of the head of the clavicle are a frequent cause of serious contusion of the region.

Fractures of the clavicle sometimes cause wounds of the vein or of the artery or of the brachial plexus. Shock accompanying the injuries of this region is sometimes very great on account of the large nerves of the region.

Neuroses. Sometimes the callus of a fracture of the clavicle includes a nervous branch; hence neuralgia or paralysis, requiring resection of the callus. A simple contusion without fracture may produce a paralysis of the plexus. Repeated slight contusions may produce paralysis, as in the case of the strap of carriers, especially water-carriers. *Softening* and *induration* present no peculiarities. *Congestion* of this region presents nothing special. *Acute inflammation* of the skin presents no peculiarities. Superficial or supra-aponeurotic cellulitis and abscess present no special characters.

Deep or subaponeurotic cellulitis and abscess are not rare;

they may develop in the region and burrow in the axilla. They may be the continuation of abscesses of the neck or axilla; these abscesses have a great tendency to burrow because of the resistance of the fascia of the region. In some cases the vessels raise the abscess, and this may cause errors of diagnosis. Pneumonia of the apex may give rise to an abscess of the region. Superficial adenitis presents no peculiarities beyond being the most frequent starting-point of primary cellulitis as a result of some affection of the upper extremity, side of chest, and posterior region of neck and head. Deep adenitis also; these are more painful, being bound down by the fascia. Chronic inflammation of any of the tissues of the region presents no peculiarities except when propagated from the lung.

Gangrene, from whatever cause, may be serious if it penetrates to the vessels and nerves. A number of cases of gangrene are recorded as following the compression of the artery for aneurisms below; many of them terminated fatally from hemorrhage. Gangrene may be propagated from gangrene of the lung.

Ulcers are rare in the region and present no peculiarities.

Fistulæ are sometimes congenital; they are most commonly due to chronic tuberculous glands; rarely to bony lesions; more rarely still to tubercles of the apex of the lung.

Tumors of the supra-clavicular region. Gaseous tumors are represented by pneumatocele of the apex of the lung; also by emphysema in cases of wounds, and of general pulmonary emphysema. *Liquid tumors*—liquid hæmatoma is not rare, on account of the frequency of the wounds of the region. Varix or dilatation of the subclavian vein is not rare in some forms of disease of the heart. Angioma presents nothing peculiar. Idiopathic aneurisms are comparatively frequent; the modern treatment is thorough asepsis, more especially here than anywhere else; resection of a part of the inner extremity of the clavicle and corresponding part of the sternum; ligation of the first portion of the subclavian with double catgut ligatures, without rupturing the coats, and leaving a bloodless

space between; also ligation of the vertebral in a like manner at the same sitting. Recurrent aneurisms should be treated by ligation of the vertebral (if not already done) and of the axilllary artery above the subscapular.

Inflamed aneurisms should be treated by placing a provisional loop ligature around the first portion of the subclavian, also a permanent ligature around the axillary above the origin of the subscapular; then incision of the sac, clamping and ligating the subclavian where it enters the sac, and also of the other bleeding points; extirpation of the sac if not too adherent to important surrounding structures. Lymphangioma is not rare and presents no peculiarity. Serous cysts are frequent in children; they are very soft and feel reducible, but they are not. Mucoid, soft dermoid cysts present no peculiarities. Bursal cysts may develop under a "pad." Hydatid cysts are most rare. Purulent cysts or chronic abscesses usually come from other glands, very seldom from the lungs. Abscesses by congestion are not comparatively rare in this region, coming from the base of the skull or from the neck, on their way to the axilla, following the sheaths of the vessels and nerves more particularly.

Solid tumors. Cicatricial keloids are not so rare here when the cicatrices draw the head to one side. Clotted hæmatoma may follow injuries of vessels as explained above. A fibrinous hæmatoma following a cured aneurism was removed by Dr. Shopf. Sebaceous cysts and hard dermoid cysts present no peculiarities. Simple adenoma or lymphadenoma presents nothing peculiar. Adenoma of Hodgkin's disease is commonly met with here; also strumous adenoma, tuberculous adenoma, syphilitic adenoma; adenoma of glanders rarely. Lipoma may be superficial or deep. There exists here a pseudo-lipoma occurring in women over forty, due to arthritism and diabetes; it is diffused, projects between the sterno-mastoid and trapezius, and causes serious pressure-symptoms: it may reach the mediastinum; it should be operated upon if pressure-symptoms occur. Fibroma, myoma, myxoma, neuroma present no peculiarities. Chondroma is rare. Osteoma may

arise from the first or second rib, clavicle, or vertebræ; seven cases of the last are recorded; they must not be confounded with an anomalous "cervical rib." Encephaloid, melanotic, colloid, pulsating encephaloid, epithelioma, carcinoma, scirrhus sarcoma, are very rarely primary; they are mostly consecutive, and usually come from the glands of the axilla, themselves commonly affected by cancers of the mammary glands. A peculiar tumor in this region is a possible aberrant goitre, already described with the thyroid region.

PECULIARITIES OF THE SURGICAL DISEASES AND INJURIES OF THE POSTERIOR REGION OF THE NECK.

Congenital atrophy and hypertrophic malformations of the posterior region of the neck are rare. The most common is represented by a peculiar form of spina bifida. Congenital deviations are due to the congenital affections of the vertebræ and to torticollis.

Acquired or post-natal malformations, atrophic and hypertrophic deviations are due to neuroses (torticollis, paralysis), to injuries, to inflammations, gangrene, ulcers, fistulæ, tumors, operations, cicatrices.

Swellings of all kinds, due to the same causes, may be observed, but present nothing peculiar; the most common is the one produced by the chronic arthritis of the articulations between the occipital and the vertebræ, and between the first vertebræ themselves, and called post-cervical or occipital arthritis or suboccipital disease.

Burns and frost-bites are only particularly important here because of the cicatrices which may follow, causing disfigurement in an exposed part, and also possibly causing deviations of the head from retraction.

Contusions are more frequent than in front; they are particularly painful because the muscles contused are those which keep the head in balance; they are often accompanied by fracture of the spinous processes and laminæ, contusion and concussion of the spinal cord and even of the brain.

Punctured, non-penetrating wounds—*i.e.*, not penetrating the vertebral artery and the spinal cord—are simple wounds, and seldom give rise to any trouble. However, should they be large, punctured wounds and strike the deep cervical artery or the posterior jugular vein, they may give rise to serious hæmatoma. When this persists it should be aspirated or incised. When it pulsates it is a traumatic aneurism of the said artery, and it should be treated as such. Punctured wounds of the vertebral artery may give rise to an aneurism also, which must be treated as such—that is, by ligating above or below, or both, when possible, and then incised. Much hemorrhage must be expected from the untied end, and the surgeon must plug tight with aseptic sponge and make firm pressure with a bandage.

Punctured wounds of the spinal canal through the interlaminar spaces, when the head is flexed forcibly or through a fracture of the laminæ, are serious only if becoming infected. Incised wounds reaching the spinal cord itself are followed by paralysis of the parts below. If the wound is and remains uninfected, the cicatrization by primary union may take place and the paralysis disappear; if not, it will be permanent. If between the occipital and the atlas or axis the oblong medulla is severed, death is instantaneous. Infanticide is often produced by a long needle or pin driven between the occiput and the vertebra. If the lesion is above the origin of the phrenic, death follows quickly by paralysis of the diaphragm. Incised wounds of muscles are usually due to sabre-cuts; they may include almost all the muscles; they may reach the vertebræ, when the head drops forward; the hemorrhage is great. Incised wounds of the vertebral artery give rise to profuse hemorrhage. The peculiarities of the treatment of these wounds is prompt attention to the vertebral, the impossibility of ligating both ends if it has been wounded high up, the suturing of the large muscles, the difficulty of keeping the head steady and to secure drainage; a liquid glass bandage or a jury-mast apparatus will assist materially.

Wounds of the posterior region are said to be followed by sexual impotency when the membranes of the cord are involved; also by paresis and wasting of the lower extremities; also of the testicle. Larrey contends that this may take place even when the cord is not affected. Contused or lacerated wounds present nothing particular.

Gunshot-wounds are usually serious if they reach the membranes on the cord. When pressure-symptoms are present very extensive and deliberate dissections must be done to remove the ball, the fragments of broken lamellæ, or clots, or foreign bodies which cause the pressure. Poisoned wounds, stings, bites, present no peculiarities. Foreign bodies causing pressure-symptoms on the cord must be removed at almost any cost.

Ruptures of the muscles of the nucha are reported in those who carry heavy loads on the head; the symptoms are those of other muscular ruptures.

Ruptures of the attachments of the rhomboid and of the elevator of the angle of the scapula have been seen in farm laborers. Sprains, dislocations, fractures of bone, belong to another chapter. Shock accompanying the injuries of the posterior region is usually great, being often complicated with concussion and contusion of the cord or of the cerebellum or of the whole brain.

Neuroses are represented by the acute torticollis (posterior) of the trapezius. It is said to be even more frequent than the torticollis of the sterno-mastoid. When in the trapezius and complexus the head is inclined to the affected side, but the face is turned toward the opposite side; the head is slightly thrown backward. There is no cord, no diffuse induration, no atrophy of the face; the pain is near the atlas and is increased by pressure; under anæsthesia the head can be straightened. This torticollis may be confounded with occipital arthritis with inclination of the head. The treatment consists in applying a liquid glass bandage or plaster apparatus; it should be worn one year. When both the trapezius muscles are affected the head is thrown back. In cases

of torticollis of the trapezius the sterno-mastoid is often also contracted, but it is a contraction of immobilization; the pain is along the trapezius and not along the sterno-mastoid. Very often the torticollis affects also simultaneously the deeper muscles—the splenius, the elevator muscle of the scapula, the rhomboid. The scalenes and the platysma are sometimes the site of torticollis. Chronic or permanent trapezius torticollis is rare.

Softening or *induration* presents nothing of special interest.

Congestion of the posterior region presents nothing special.

Acute *inflammation* of the skin is represented specially by large boils and carbuncles which are comparatively very painful; they give great pain because the tissues are inextensible; sometimes they are followed by extensive sloughing when the general health is low, especially if diabetes be present; they are also serious, because the veins of the upper part of the region open into the sinuses of the dura mater. The circumscribed anthrax is not so grave, and is usually amenable to ordinary treatment. Diffused anthrax extends continuously from the superior curved line of the occipital to the seventh cervical and from one ear to the other; nothing stops it, not even the largest or deepest incisions, until it has reached the above limits. It is as though a certain extent of tissue was infiltrated with microbes or as when an artery is obliterated and gangrene continues until all the area of the artery is mortified (Tillaux). Extensive incisions are even hurtful until limitation has been established, on account of the shock of the operation. When limitation has taken place, then incisions or the curette assist in removing the mortified tissues. Acute cellulitis, extensive gangrene or post-cervical abscess—phlegmons, are sometimes observed here when the general health is low, specially if diabetes be present, and for the other reasons explained above. They are really adeno-cellulitis or phlegmons, because all inflammation here begins in the glands; they are usually due to disease of the scalp and skin; they may be superficial or deep; deep abscesses usually cause great pain on account of the thickness of the skin;

they give rise to but very little redness and œdema; they have a tendency to flatten and spread because of the thickness of the skin; they are slow in becoming superficial for the same reason; the knife must penetrate deeply to reach them. Acute lymphadenitis, however, is itself rare; it is due to lesions of the scalp and skin. Chronic inflammations are represented specially by acne, by syphilitic eruptions and by the well-known syphilitic adenitis of the suboccipital and mastoid regions; these lesions are so constant in syphilis that Ricord used to say that was the place to feel the pulse of syphilis.

Gangrene of the region is serious when extensive or deep, on account of the cicatrices and their consequences. *Ulcers* are rare and present no peculiarities. The same is true of *fistulæ.*

Tumors of the posterior region of the neck. *Gaseous* tumors are represented only by the extension of an emphysema.

Liquid tumors. Liquid hæmatoma presents no peculiarity. Varix and angioma are very rare. Aneurisms of the vertebral artery are not rare in this region; they are usually traumatic and are often high up. The artery should be ligated above and below, if possible; or above or below whenever possible, and the sac incised and immediately plugged with aseptic sponge; if possible, the distal bleeding end should be ligated. In case a secondary hemorrhage should occur through the distal end and be uncontrollable by plugging the ligation of the vertebral on the other side must be considered and weighed.

Lymphangiomata are here rare. Serous cysts and congenital cysts are sometimes median and sometimes lateral; they may reach as low down as the dorsal region and from the rachis to the acromion; they are usually met with in children born prematurely and presenting other malformations; they are sometimes transformed into lipoma; according to Lannelongue, they are congenital cystic lymphangiomata. Mucoid cysts and dermoids are rare and present no peculiarities. Bursal cysts or hygromata are sometimes met with

over the spinous processes of the seventh cervical. Purulent cysts or chronic abscesses, idiopathic or symptomatic, or by congestion, are rare here.

Solid tumors. Comedones are not rare, neither is keloid. Clotted and solidified hæmatomas present no peculiarities. Sebaceous and dermoid cysts are usually difficult to dissect, because they are so intimately adherent to the surrounding tissues. Simple adenoma or lymphadenoma, adenoma of Hodgkin's disease, strumous and tuberculous adenoma, are comparatively rare. Adenomata syphilitica—*i.e.*, the chronic enlargements spoken of above—are very common and almost pathognomonic of syphilis. A case of gumma of the trapezius has been recorded. Adenoma due to glanders is most rare.

Lipoma is common. The circumscribed form is the most frequent; this region is a site of predilection; it sometimes sends fibrous processes to the vertebræ. A peculiar circumscribed form of lipoma is described in prostitutes, over the point of junction of the neck and back of the curve seen there, and due, it is said, to the position they so often have to assume. Diffuse lipoma is sometimes limited to the region and sometimes a part of the diffuse kind of lipoma which occupies the whole circumference of the neck like a cravat; it is such in some cases that it is impossible to fix the limit of its margin —*i.e.*, to say where it ends and where the natural fat begins. Fibroma of the region sometimes also presents adhesion to the vertebræ. Cervico-dorsal fibromata are common (Guyon); myxoma, myoma, neuroma, chondroma, osteoma are rare. The same is true of encephaloid, melanotic, colloid, pulsating, sarcoma, epithelioma, carcinoma, scirrhus, and they present no peculiarities.

The surgical operations of the posterior region of the neck present no peculiarities.

ADYNAMIC OBSTRUCTION OF THE BOWELS.

By William H. Myers, M.D.,
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I will direct your attention to the consideration of the intestinal tract—a province where the physician and the surgeon are often compelled to act in unison; where sometimes the medical treatment is too prolonged and at other times the surgical interference is too early, and where a correct diagnosis must be made to differentiate early the cases which require surgical help from those which do not.

In a case of obstruction of the bowels it is of primary importance that the cause be definitely ascertained at the earliest moment. We must learn the beginnings of disease. As remarked by Sir William Gull, "Often when the gathered clouds of the final storm have filled the atmosphere, it is in vain that we look around to see from what point in the heavens it began." No cases give rise to more difficulty and doubt in our practice than those of intestinal obstruction, and by this we mean acute cases with "total arrest of the passage of feces and flatus," dependent upon a great variety of conditions, all of which imperil life and give rise to grave doubts as to the cause of the obstruction.

To mechanical obstruction dependent upon compression—the presence of foreign bodies, such as gallstones, calculi, and neoplasms, intussusception, and volvulus—I shall not allude, but I shall confine my discussion to obstruction resulting from adynamia of the intestines, where there is no diminution of the lumen at any point, but relaxation and complete loss of muscular power and inability in the muscular tissue to pass on the contents of the bowels. This condition

has been most frequently confused with cases of mechanical obstruction of the bowels, presenting conspicuous symptoms of internal strangulation, while the autopsy would disclose an intestine entirely free from mechanical obstruction.

These cases are due to paralysis of some segment of the intestines; the peristaltic movement having ceased at that point, the passage of the contents is thereby arrested. It is surprising how often this condition is overlooked. In severe cases death may occur in three or four days; usually complete paralysis is preceded by an intensely excited action of the bowels. Keith relates the following case:

"A stout American, aged forty-five years, the proprietor of a cattle ranche, started off before the midday dinner to assist in exterminating a prairie fire miles away from his house. He rode home after sunset, and, being very hungry, he ate a large supper. Four or five hours after he was awakened out of his sleep by an attack of intense colic, accompanied by vomiting. He took a large dose of laudanum, and as the pain did not abate he had a warm bath and application to the abdomen of laudanum. The pain was entirely relieved by this treatment, but in the morning the abdomen was seen to be much distended, and the vomiting had returned. The pulse was rapid, and within thirty-six hours from the commencement of the attack the patient was dead. A post-mortem examination was made, but nothing was found except general distention of the bowels."

In all cases of paralysis of the intestine any operative procedure is useless and injurious.

Dr. Henri Henrot wrote a treatise upon this subject in 1865. He divided all cases of paralysis of the intestine leading to obstruction into three classes:

1. Direct paralysis of a segment of intestine due to changes in its walls.

2. Indirect paralysis depending upon reflex nerve-action.

3. Paralysis of the bowel in a general affection of the nervous system.

In the first form a knuckle of intestine has been strangu-

lated in a hernia; it is reduced either by taxis or operation, while the patient is under the influence of an anæsthetic; but the symptoms of strangulation persist and the patient dies. The autopsy reveals the bowel free; no mechanical obstruction or peritonitis present. Now, what are the usual explanations given as to the cause of death? One says shock; another says shock, with a feeble heart; another says chloroform; another says rapid septic poisoning. These causes of death are inadequate to account for death in the cases alluded to, but paralysis of the segment of the bowel pinched clears up all difficulties and is the only theory consistent with known pathological laws. A man receives a severe injury to the abdomen, a kick from a horse, perhaps; symptoms of obstruction follow. This we ascribe to paralysis of the injured portion of the intestine. Many of you no doubt have had cases of severe abdominal contusion with shock, and you are able to recall the occurrence of tympanites accompanied by constipation of the bowels as a sequence. To what is this due, assuming that there is no visceral lesion? I believe that it is referable to the injury inflicted on the ganglionic nerves; the functions of these nerve-centres for the time being suspended, and paralysis of the peristaltic movements of the intestines is the consequence. The following proposition contains my opinion: that tympanites and constipation from temporary paralysis of the muscular coat of the bowel are the consequence of shock or concussion of the cyclo-ganglionic nerve-centres.

Le Gros Clark remarks: "Irremediable paralysis precedes gangrene, and is often by itself a cause of fatality, even when relief has been afforded by operation; indeed, every practical surgeon knows that it is one of the chief difficulties with which he has to contend after liberating the strictured intestine . . . A rapidly distended bowel is most favorable to paralysis; and I believe that paralysis, with its usual concomitant distention, is a rife source of fatality in strangulated intestine." After these practical and highly suggestive observations he proceeds to remark that "regurgitant intestinal

vomit is not necessarily dependent on mechanical obstruction, and the arrested peristalsis may be dependent upon obstruction from paralysis. Thus, after relief of strangulation by operation stercoraceous vomiting may continue for a time and yet the patient recover, but in many cases persistent paralysis of the intestine is the cause of death. In these cases of persistent constipation with vomiting the autopsy reveals no mechanical obstruction from any cause.

Mrs. G., aged seventy-nine years, had long been afflicted with chronic cystitis, and had for months been confined to her bed. During her illness I discovered a femoral hernia. It was irreducible, situated upon the right side, the size of an orange. She was fully convalesced; the cystitis disappeared. While exerting herself about her room she was suddenly seized with pain in the swelling. This continued for forty-eight hours before I was called to see her. At my visit I found it hard, tense, and tender; constipation became absolute; the vomiting became feculent in twenty-four hours from the time the above symptoms appeared. The symptoms were urgent, so that I did not persist with the taxis; delay was dangerous, for tympanites and evidences of peritonitis were now present. Asepsis was carried out in the minutest detail. I was assisted by Dr. B. V. Sweringen, who administered ether. A vertical incision was made in the inside of the tumor three inches in length, extending above the top of the swelling. Upon opening the sac the omentum presented itself. It was unravelled and the intestine sought for, upon finding which it was discovered to be a small knuckle, tense, much altered in color, being quite dark. The bulk of the swelling being the omentmm, it was tied with silk ligatures and cut away very close to the silk. The adhesions were principally omental, within the interior of the sac. I now abridged the sac and tied it with silk, and reduced within the peritoneal cavity.

I allude to this case for the reason that it possessed a few points of interest that I desired to emphasize:

1. The age of the patient.
2. The long duration of her previous illness.

3. The feculent vomiting, which continued for ten days after the operation, and which was best controlled by allowing the patient to drink large quantities of hot water.

4. The constipation was absolute for eighteen days. During this time rectal alimentation with stimulants was kept up. Upon the eighteenth day after the operation the bowels moved, and she progressed to a complete recovery. The feculent vomiting in this case continued after the bowels had been relieved by an operation, therefore it must have depended upon paralysis of the intestinal canal, produced by its constriction during the strangulation.

I shall now call your attention to obstruction of the bowels which is due to the arrest of peristalsis owing to the presence of peritonitis. Goodlee says: "It seems worth emphasizing that peritonitis *per se* ought always to be considered as one of the possible causes of intestinal obstruction, and that complete absence of visible peristalsis is an important indication of its presence." He evidently alludes to the fact that in an acute attack of peritonitis complete paralysis of the muscular walls of the intestine exists, destroying its function and producing obstruction.

Inflammation of the peritoneum presents symptoms common to inflammation of serous membrane. It is very seldom if ever spontaneous in its origin, usually septic, due to the presence of the propagation of bacteria and irritating chemical products which result. The walls of the intestine are altered.

The subserous muscular and mucous coats are œdematous and thickened, and there is present tympanitic distention of the intestine from paralysis of its muscular coat. Rokitansky asserts that acute general peritonitis very often terminates fatally with symptoms of intestinal paralysis and with imminent or existing *ileus*.

The ileus which occurs in general peritonitis is like the dilatation of the intestine, the consequence of paralysis of the muscular coat, a relation observed to exist whenever muscular fibres are subjacent to serous membranes.

Of the pathological import of tympanites I have only this

to say: that there is a definite quiescence or strangulation of the intestinal walls, an arrest or exhaustion of peristalsis often produced by peritonitis. The intestinal gases are exposed to the influence of two varieties of pressure: the pressure of the abdominal muscles on the intestinal canal and that of the muscular parietes of the tube on its contents, and these regulate the bulk of the aëriform fluids by which they are occupied, diminish the pressure by a stimulus, and muscular relaxation follows.

When we irritate the peritoneal coat of the intestine of a living animal we excite a local relaxation of the walls of the canal; a swelling is formed by the relaxed coats of the bowel occupied by its gaseous contents.

Now, in severe peritonitis, not only the muscular walls of the intestine, but the muscles of the abdomen are relaxed, and we have that general gaseous distention of the flaccid, paralyzed abdomen which constitutes some form of tympanites always present in peritonitis.. Whenever stercoraceous vomiting occurs in peritonitis it is evidence of intestinal obstruction, such an obstruction usually being the result of the peritonitis. Constipation due to paralysis of the muscular coat of the intestine is the rule, especially in the early stage of peritonitis. Flint speaks of cases that simulate obstruction from structural causes where there is regurgitation of the contents of the small intestine, which has a stercoraceous odor from the diffusion of gases contained in the large intestine, and he attributes the obstruction to an inversion of the peristaltic movement, or it may be due to paralysis of a portion of the tube and consequent failure of this portion to propel its contents. Bennett and Abercrombie accepted this explanation.

We are sometimes astonished at the rapidity with which the abdomen becomes distended, and we at once perceive this condition to be one of pressing danger to the patient. The diaphragm will not descend, and the respiration is therefore imperfect. The cavity of the abdomen possesses only certain dimensions; its capacity for containing the inflamed bowel

without angulating at the return of the convolutions. These angles must be acute and sharp, so that the bowel is effectually obstructed as completely as in volvulus or in a hernial protrusion with strangulation. Now will follow eructations of air, then colorless fluid, then colored mucus, with bile growing constantly greener and darker, showing that the work of mischief is complete.

Obstruction of the bowels causes between 1 and 2 per cent. of the deaths following laparotomy. The majority of these cases are perhaps dependent upon mechanical causes—adhesions, etc.—but some are due to paralysis of movement of the intestine following sepsis or injury to the nerve-supply of the muscular coat.

How can we distinguish clinically the various forms of intestinal obstruction? In the differential diagnosis we may note the following points: in a case due to paralysis—

Mode of onset is not definite.

A rigor may usher in peritonitis, but not in obstruction.

The temperature in serous inflammation is often subnormal. This is rare in strangulation.

Here we must ask ourselves, What is the seat of the disease? Is it in the larger or smaller intestine?

In Obstruction of the Small Intestine.	*In Obstruction of the Large Intestine.*
1. The pain and other symptoms are more acute and the course more rapid.	1. The pain and other symptoms are less acute and the course more gradual.
2. Vomiting is early and urgent.	2. Vomiting is long delayed, or of but little severity.
3. The urine is scanty.	3. The urine is abundant.
4. Distention is early, but not excessive, and affects the small intestine alone.	4. Distention occurs only after an interval, but reaches an extreme degree and affects especially the large intestine, so that the transverse colon may be seen crossing the upper part of the abdomen, and there is fulness in one or both loins.

The treatment is the difficult part of this subject. Enforce the stoppage of fluids of all kinds by the mouth.

In the consideration of the specific treatment we must bear in mind that there is complete arrest of the peristaltic action, and this must be re-established if possible.

We must also look to the soothing of the excited sympathetic. Get rid of the irritation. Would you operate? If you do, you will be disappointed to find the procedure quite useless. It cannot restore the lost tone of the intestine. How fashionable it is to operate in every case of intestinal obstruction, to perform surgical feats, often making the death-bed the field for surgical display!

SOME FURTHER OBSERVATIONS CONCERNING MOVABLE KIDNEY.

By Charles P. Noble, M.D.,
Philadelphia.

Before the Pennsylvania State Medical Society, in May, 1895, I read a paper entitled "Movable Kidney." (Gaillard's *Med. Journ.*, N. Y., 1895, vol. lxi. 59–65.) This paper was elementary in its character and dealt with the subject in a systematic manner. I propose at this time to review the conclusions arrived at in the paper referred to, to present the results which I have obtained from the operation of nephrorrhaphy, and to develop more fully some points only touched upon in the previous paper. The following are the conclusions:

"Movable kidney is a very common condition among women. I find it in one-fourth of my own patients. Both kidneys are movable in about one-tenth of the cases.

"The underlying cause of movable kidney is a deficiency of adipose tissue, especially in the perirenal region. Tight lacing, multiple pregnancies, and falls occasionally act as contributing causes.

"The symptoms of movable kidney are both reflex and local. The reflex symptoms are those at times of neurasthenia, irrespective of its cause. In other cases nervous dyspepsia, palpitation of the heart, distention of the abdomen with gas, and neuralgic areas, are the symptoms complained of. Patients are usually unable to lie upon the side opposite to the movable kidney. The local symptoms are a sense of weight or bearing down, soreness in the kidney region, attacks of pain

similar to renal colic, and in rare instances symptoms of strangulation due to torsion of the vessels of the kidney.

"Movable kidney may be suspected when its rational symptoms are present, but the diagnosis must be made by a physical exploration. This should be made with the patient in a standing position. The diagnosis can be made with the patient lying on her back only in long-standing cases—where the displacement is extreme—as usually in that position the kidney slips up under the margin of the ribs. In many cases movable kidney gives rise to no symptoms, and therefore does not require treatment. The rest-cure promises to be efficient in cases of slight degree, as the kidney returns to its normal position while the patient is lying on her back, and the increase in fat, which the rest-cure usually brings about, should effect a cure. The rest-cure used in cases of long standing, with extreme displacement of the kidney, will improve the general condition of the patient, but will not improve the local trouble. Nephrorrhaphy is a simple and safe operation, which should be done in the cases having well-marked displacement—that is, three inches and upward. The more marked the local symptoms, the more necessary is the operation. The reported cases indicate that the results are permanent."

Further study of the subject for a year and a half has only served to confirm most of the preceding opinions. I have nothing new to offer concerning the frequency, the cause, the symptoms, or the diagnosis of movable kidney. These points have been so well worked out by others, as well as by myself, that they may be considered as definitely established.

I would like to draw attention anew to the importance of examining patients in the standing position, not only for the diagnosis of movable kidney, but for the estimation of the degree both of its displacement and of its movability. For some years in the more or less systematic examination of office patients, I looked in vain for a case of movable kidney. My interest in the subject was stimulated anew partly by Dr. Edebohls' original paper on the subject, and more especially

by a private interview with him in 1893, after which I began systematically to look for movable kidneys in all cases having the rational symptoms of this disorder. These examinations were all made with the patient lying on the back upon the office examining-table, and were entirely fruitless. Finally it occurred to me that an examination of the patient in an erect posture would give better results, and experience has shown this to be the solution of the problem of diagnosis.

After one has become skilled in searching for movable kidneys, the diagnosis can frequently be made even with the patient on her back. The patient should be instructed to take deep inspirations, followed by full expirations, during which she should relax the abdominal muscles. If at the end of inspiration the tissues immediately below the ribs be compressed between the thumb and finger, not infrequently it is possible to grasp the kidney as it is forced down below the margin of the ribs by inspiration; and in cases in which the degree of movability is great it is often possible to palpate the organ with great facility. This method of examination, however, gives very inaccurate results as to the degree of movability of the kidney. The displacement of the kidney at the time of examination depends entirely upon the voluntary efforts of the patient at inspiration and straining, and as a consequence extremely movable kidneys are at times forced down but little, and in other cases slightly movable kidneys are forced down to the limit of their movability.

The best method of examination is as follows: the patient's clothing should be loosened, all bands about the waist unfastened, and the skirt supported by a nurse or assistant, so that the patient will not be embarrassed with the fear that her clothing will fall off. She should then stand before a table or desk of convenient height (about thirty inches), with the examiner seated upon her right. She should then bend forward from the hips, and support some of her weight by resting her hands upon the table. She should be directed to respire regularly, care being taken to relax herself thoroughly during expiration. The examiner's left hand should be placed

against the lumbar region posteriorly, and his right hand in a corresponding position in front of the kidney. By a conjoint manipulation the region between the two hands can be carefully palpated, and if present the kidney is easily recognized. The points to be looked for are the shape and size of the kidney, and the fact that it can readily be displaced upward beneath the margin of the ribs, and that it will return to its former location so soon as the examiner's hands no longer support it. When the kidney is compressed, as a general rule, the patient complains of tenderness or pain of a peculiar character, and often makes the statement that the pain causes a feeling of faintness or nausea.

By this method it is possible not only to diagnose the existence of movable kidney, but to estimate with exactness both the extent of the displacement and the degree of the movability. This undoubtedly is one of the chief merits of the method of examination, because of its very positive bearing upon the indications for treatment.

Sufficient time has not yet elapsed to justify dogmatic statements concerning the treatment of movable kidney. From the beginning I have been impressed with the necessity of studying this problem in the broadest possible way, and further observation has served to confirm this judgment. Very frequently the displacement of the kidney is only one of a number of morbid conditions which exist in the same patient. In cases of downward displacement of the abdominal viscera as a whole, or of several of these viscera, displacement of the kidney is a common accompaniment. In such cases the displacement of the kidney is only one factor, and treatment addressed to it alone naturally would fail to effect a cure. In such cases nephrorrhaphy must be preceded by or followed by proper treatment for dilatation and displacement of the stomach, and to tone up not only the muscular coat of the alimentary canal, but the abdominal muscles and the general muscular system of the patient.

Hysterical and neurasthenic patients having movable kidneys require special study. It should not be forgotten that

in about half the number of cases in which the kidney is movable symptoms are absent; therefore, in cases presenting hysterical or neurasthenic symptoms, it by no means follows that these are due to the dislocation of the kidney. Before advising nephrorrhaphy in this class of cases, their nervous symptoms should be treated by approved methods, and operation should only be undertaken when non-operative methods have failed to give good results.

In cases of movable kidney of slight degree and not of long standing, a course of treatment addressed to improving the general nutrition and increasing the amount of fat frequently effects a cure. The rest-cure is especially valuable in this class of cases. While the patient remains upon her back in bed the kidney occupies its normal position. If, by means of the rest-cure and other measures directed to improve nutrition and increase the body-weight, the patient will take on fat, a permanent cure can be effected.

Palliative treatment is useless in cases in which the kidney is extremely movable and much displaced. Such cases should have nephrorrhaphy performed. This is especially true for those in which marked local symptoms are present, such as pain in the kidney itself, a sensation of dragging, caused by traction of the kidney on its nerves and vessels, attacks of hydronephrosis due to obstruction of the ureter, or symptoms of strangulation due to extreme torsion of the kidney on its vessels. In such cases the integrity of the kidney structure is endangered, which gives another indication for operation beside that of the more usual symptoms due to the displacement. One case of chronic hydronephrosis with destruction of the kidney-substance, due to neglected movable kidney, has come under the writer's notice.

My experience with nephrorrhaphy embraces eighteen cases, operated upon between October 26, 1893, and September 3, 1896. Of these, seventeen recovered and one died. The technique employed in the first cases was that of Edebohls, which may be briefly described as follows: the patient is placed prone upon the operating-table, with an air-cushion

under the epigastrium. The object of the pad is to force the kidneys toward the loin. Under the usual antiseptic precautions an incision is made between the last rib and the ilium, about over the edge of the quadratus lumborum muscle. This is carried down through the muscular structures of the back, when any bleeding points are caught and ligated. The layer of fascia which lies below the muscles is then divided, which exposes the perirenal fat or fatty capsule of the kidney. This is seized and torn through or incised, when the kidney is found and teased out through the lumbar incision. The fatty capsule of the kidney is carefully stripped away from the kidney itself, and redundant portions of the fatty capsule are excised. The proper capsule is then split along the external border of the kidney, and by blunt dissection is separated for half an inch on both sides of the incision. Venous oozing from the kidney is disregarded. Three or four sutures of silkworm-gut are passed through the kidney in such a way as to separate the reflected proper capsule of the kidney. The kidney is now reposited within the abdominal cavity, and the ends of the sutures are drawn, by means of a needle and carrier, through the muscular structure of the back. A silkworm-gut drain is then introduced down to and along the external border of the kidney. The wound is now cleansed and the sutures tied. These sutures are introduced in such a way that the exposed tissue of the kidney itself is brought in contact with the muscular structures of the back. Additional silkworm-gut sutures are passed through the muscles to close the incision. All the sutures up to this point have entered and emerged just externally to the muscular layer, so that when tied they are buried beneath the skin and subcutaneous fat. A row of superficial interrupted sutures is now introduced to complete the closure of the wound. The wound is dressed with an antiseptic dressing, abundance of gauze being used to absorb the serum, which usually pours out along the drain quite freely. Edebohls does not remove the drain for some days.

Experience with this technique has caused me to modify it

in various ways. My own experience corresponds with that of Edebohls, that suppuration occurs in a considerable percentage of cases treated in this way. Four cases out of eighteen suppurated. In one the suppuration was extensive and immediately followed the operation. In another it followed the operation immediately, and was due to the fact that a silk ligature was overlooked and the end of it hung out through the wound, serving as a means of infection. Only one deep suture was involved, and when this was removed the sinus healed up and the patient's recovery was not delayed. In two other cases suppuration took place some weeks after operation. In one the deep stitches were removed and prompt healing took place; in the other a stitch was cut through on both sides of the knot, leaving the loop in, and this patient was bothered for a long time with a sinus before sound healing took place. This very large percentage of suppuration has made me feel the necessity for an improvement in the technique employed. In the last patient operated upon every bleeding point was ligated and the wound carefully closed without drainage. Unless future experience shall show that the results under this method are not so good as before, I shall continue to employ it. I have continued to use silk-worm-gut as the suture material because it has given such uniformly good results as a buried suture in cœliotomy and herniotomy cases. Should a large percentage of cases suppurate, undoubtedly it would be better to use an absorbable suture, even though the percentage of relapses should thereby be increased. A rigid attention to asepsis and the ligation of bleeding points should, however, reduce the chances of suppuration to a minimum.

It has occurred to me, as doubtless to all operators, that the suture might constitute the point of irritation for the formation of stone in the kidney. No such case has been reported, and the nature of the processes of repair is such as to indicate that it is not likely to occur. A scar-tissue capsule is formed about the stitch, shutting it off from the secret-

ing structure of the kidney, and thus preventing the suture from coming in contact with the urine.

Attention should be called to the necessity for care in tying the sutures which pass through the kidney. These should be tied snugly but not tightly, as the kidney-substance is so friable that it would be very easy to cut through the kidney by too great tension in tying the suture. A useful point is to introduce a suture through the muscles of the back between each of the kidney sutures. By tying this set of sutures snugly the wound in the muscles can be closed without the necessity of putting tension upon the kidney suture. In patients having much subcutaneous fat it is well to have the buried sutures include a part of the fatty layer. This makes the knot more superficial and more easily removed in cases of suppuration.

After splitting and dissecting off the proper capsule of the kidney in a number of cases, after the suggestion of Edebohls, I abandoned this practice, because it did not appeal to me as serving any good purpose. The proper capsule of the kidney is not like a mucous membrane, and I see no reason why it will not unite to the muscles of the back as firmly as the substance of the kidney itself. If my supposition is correct, this procedure merely adds an additional traumatism to the kidney and increases the surface for oozing, while adding nothing to the success of the operation.

Those having had little experience in operations upon the kidney will at times be puzzled to locate it after making the lumbar incision. If, as is usually the case, the operation is done upon the right side, unless care is taken, not infrequently the liver will be mistaken for the kidney, and the peritoneal cavity opened as a consequence. The two organs can be distinguishd by feeling along their borders. The border of the kidney is round, while that of the liver is very thin. When the kidney is not felt or seen when the perirenal fat is opened, and is not felt at or about the margin of the ribs, it is well before searching further to feel down toward the pelvis. Not infrequently, in cases having very movable kidneys, the kid-

ney will be found down in the false pelvis. To remember this point will often avoid a tedious search.

After nephrorrhaphy, as a rule, patients make a smooth progress toward a recovery from the operation. The amount of pain complained of is somewhat out of proportion to the gravity of the operation, and is due probably in part to the fact that it is necessary to lie upon the wound, and in part also to exudate immediately behind the peritoneum. In three cases upon whom I have operated obstinate nausea and vomiting resulted. These were due probably in part to the condition of health of the particular patients, and in part to the sympathetic relation which exists between the kidney and the stomach.

The amount of urine passed after nephrorrhaphy does not vary much from that passed by other patients upon restricted diet. In the annexed table the amount of urine passed by the patients during the first five days is given. In five cases the operation was followed by nephritis, as indicated by the presence of tube-casts and albumin in the urine. In only two of the patients, however, were there any of the constitutional symptoms of acute nephritis. In all cases the urine was free from tube-casts and albumin before the patients were discharged.

One patient died. This patient had been an invalid for years and had chronic Bright's disease. In addition to the general nervous symptoms due to the displacement of the kidney, she suffered marked pain in the kidney itself. The operation was undertaken because of the aggravated suffering of the patient, with a distinct recognition of the extra risk involved. She died suddenly on the fifth day. A mild acute nephritis followed the operation, accompanied by some nausea. Apparently she gradually improved after her operation, and on the fifth day was feeling quite comfortable, except that she had some palpitation of the heart. Suddenly she cried out for air, sat up in bed, and died. No autopsy was permitted, so that the exact cause of death was not known; it was probably an embolus in the coronary artery or one in the pulmon-

ary artery. The results in seventeen cases have varied, but in general have been very satisfactory. In nine cases women who had been chronic invalids for years were restored to health. In these cases the operation has been absolutely a success. Of the other eight cases, four are too recent to form an opinion as to the permanent effect of the operation. In two of them the patients are much better and have become quite stout. Of the remaining four cases, one has been counted double, as she had both kidneys sewed at different times. From being an absolute invalid she is now a hard-working woman. One patient has been an attendant in doctors' offices since she was a girl. She has gained flesh and lost some of her old symptoms, but still remains neurasthenic. The remaining two cases feel entirely satisfied with the result of the operation. In all of the cases operated upon the kidney has remained in position. To sum up my experience, the results obtained from nephrorrhaphy for movable kidney are as satisfactory as those from any other operation in surgery.

In conclusion I feel that it is important to urge that the condition of movable kidney has been studied comparatively for a short time, and therefore it is deserving of the more attention on the part of clinicians. It is not impossible that more will be learned as to the ultimate results of nephrorrhaphy, and therefore, it is the part of wisdom to resort to this operation only after the failure of medical and hygienic measures, in cases of moderate displacement. On the other hand, experience has demonstrated the futility of such measures in cases of marked displacement, especially those having local symptoms. Some experience has accumulated to show a relation between movable kidney, hydronephrosis, and suppuration in the kidney. Nephrorrhaphy should be performed in all cases of marked displacement of the kidney, and with the expectation of a successful result in a large percentage of them.

Table of Nephrorrhaphies.

Name, date, and number.	Age	Diagnosis	Operation	Amount of urine voided per 24 hours.					Course.	Temp.	Result.	Discharge.	Remarks.
				1st.	2d.	3d.	4th.	5th.					
				ounce.	ounce.	ounce.	ounce.	ounce.					
Miss E. J. Oct. 26, 1893 No. 1.	23	Movable kidneys.	Single nephrorrhaphy. Right.	xvii	xv	xx	xx	xxvi	Good recovery; suffered very much first 3 days from vomiting.	Afebrile.	Recovered.	Dec. 9, 1893	Patient admitted to hospital Sept. 4, 1894; had stitch removed. Again, Oct. 17, 1894, with suppuration of incision. Discharged Dec. 3, 1894.
Miss E. J. Nov. 20, 1893 No. 2. Hosp.	23	.....	Left.	xx	xvi	xxii	xx	xxv	Good recovery.	Afebrile.	Recovered.	.....	
Mrs. H. Nov. 24, 1893 No. 3. Priv'te.	30?	Movable right kidney.	Single nephrorrhaphy.	.....	.....	.....	.....	.....	Uninterrupted.	Afebrile.	Recovered.	.....	
Miss S. D. Jan. 18, 1894 No. 4. Hosp.	19	Movable right kidney.	Single nephrorrhaphy.	xix	xxiii	xxiii	xxviii	xxxiii	Uninterrupted.	Afebrile.	Recovered.	Feb. 11, 1894	Suture removed July 24, 1894. Sinus curetted.
Mrs. L. June 11, 1894 No. 5. Hosp.	45?	Movable right kidney.	Single nephrorrhaphy.	xvii	xix	xxii	xxi	xxv	Nephritis.	Afebrile.	Died.	.....	Died suddenly on fifth day.
Miss E. T. Dec. 18, 1894 No. 6. Hosp.	27	Movable right kidney.	Single nephrorrhaphy.	xv	xxi	xxiv	xxii	xxxv	Good recovery.	Afebrile.	Recovered.	Jan. 23, 1895	
Mrs. A. T. Mar. 21, 1895 No. 7. Hosp.	35	Movable kidneys.	Double nephrorrhaphy.	xxiv	xxiv	xix	xxv	xxx	Uninterrupted.	Afebrile.	Recovered.	Apr. 16, 1895	
Mrs. G. April 18, 1895 No. 8. Hosp.	42	Movable right kidney.	Single nephrorrhaphy.	xiv	xxiii	xxvi	.....	.....	Good recovery.	Afebrile.	Recovered.	June 1, 1895	Incision in loin. No sutures through kidney. Fatty capsule sutured.

Mrs. D. June 17, 1895 No. 9. Priv'te.	30 ?	Movable right kidney.	Single nephrorrhaphy.	.....	.....	.....	.....	.....	Uninterrupted.	Afebrile.	Recovered.	.....	
Mrs. H. July 15, 1895 No. 10. Hosp.	43	Movable right kidney.	Single nephrorrhaphy.	xix	xx	xxi	xx	xxx	Good recovery.	Febrile.	Recovered.	Aug. 9, 1895	
Mrs. W. Sept. 2, 1895 No. 11. Hosp.	31	Movable kidneys.	Double nephrorrhaphy.	xvii	xxvi	xxviii	xxx	xxxv	Good recovery.	Afebrile.	Recovered.	Oct. 3, 1895	
Miss C. Sept. 19, 1895 No. 12. Hosp.	32	Movable right kidney.	Single nephrorrhaphy.	xvii	xvi	xxii	xxii	xxx	Uninterrupted.	Afebrile.	Recovered.	Oct. 25, 1895	
Miss C. B. Nov. 14, 1895 No. 13. Hosp.	37	Movable right kidney.	Single nephrorrhaphy.	xvi	xxviii	xv	xviii	xvi	Good recovery. Nephritis.	Febrile.	Recovered.	Jan. 4, 1896	
Mrs. E. Nov. 14, 1895 No. 14. Hosp.	21	Movable right kidney.	Single nephrorrhaphy.	xii	xxiv	xxvi	xxii	xxx	Uninterrupted.	Afebrile.	Recovered.	Dec. 10, 1895	
Mrs. C. Dec. 12, 1895 No. 15. Hosp.	35	Movable right kidney.	Single nephrorrhaphy.	xiii	xv	xvii	xxii	xxvi	Uninterrupted.	Afebrile.	Recovered.	Feb. 1, 1896	
Mrs. V. April 25, 1896 No. 16. Hosp.	...	Movable kidneys.	Double nephrorrhaphy.	.....	.....	.....	.....	.....	Good recovery. Suppuration of left incision. Nephritis.	Febrile.	Recovered.	July 11, 1896	Deep sutures on left side were removed.
Mrs. S. April 26, 1896 No. 17. Hosp.	24	Movable right kidney.	Single nephrorrhaphy.	xxv	xxv	xxix	xxx	xxviii	Good recovery. Buried suture suppurated and removed. Nephritis.	Afebrile.	Recovered.	June 6, 1896	Infection due to long end of silk ligature.
Mrs. K. J. Sept. 3, 1896 No. 18. Hosp.	35	Movable kidneys.	Double nephrorrhaphy.	xii	xxxiv	xxx	xxiv	xxxi	Uninterrupted.	Afebrile.	Recovered.	Nov. 4, 1896	

A CASE OF ACUTE NEPHRITIS FOLLOWING A LAPAROTOMY.

By J. M. Hundley, M.D.,
Baltimore.

Pauline K., aged thirty-one years, white, was admitted to the gynecological ward of the University of Maryland Hospital, September 3, 1896, at which time the following history was obtained:

Prior to her admission she said she had been having chills. She had no chill after coming under our observation. She had been taking quinine freely, which was continued for a few days. Owing to the fact that she had been taking quinine her blood was not examined for malarial organisms. Her reason for entering the hospital was for a constant pain in the right iliac region, which pain had for the past six months incapacitated her from attending to her duties as housewife. She was the mother of four children, and had had one miscarriage. She menstruated regularly and with but little pain. She was emaciated and looked as if she were overworked and poorly fed. Her radial arteries were somewhat harder than one would expect to find in a woman of her age, and her temporal arteries were distinctly perceptible and about the size of a small goose-quill. From the fact of this arterial sclerosis the daily amount of urine voided was ordered to be measured and recorded and a careful microscopical and chemical examination made of the urine also. It was found that she passed from twenty-four to thirty-two ounces of urine in twenty-four hours, which had a specific gravity of 1024; from microscopical and chemical examination the kid-

ney appeared free from disease. Her heart and lungs were normal. Vaginal examination revealed a lacerated perineum down to the sphincter, with rectocele. The uterus was found retroflexed and bound down by adhesions. The left tube and ovary seemed normal, as made out by bimanual examination. The right tube and ovary were bound tightly in adhesions. The entire mass was of the shape and size of a small sausage. This mass was thought to be a pyosalpinx at the time, but it proved to be a hydrosalpinx. From the emaciated condition of the patient and the relaxed abdominal walls her organs could be mapped out very accurately. On the 10th, seven days after her admission, she was operated on under chloroform anæsthesia. A modified Emmet operation was done on the perineum, at the same time narrowing the posterior vaginal wall. Immediately following the completion of the perineorrhaphy the abdomen was opened; the uterus was found retoflexed and adherent. The left tube and ovary were also tightly adherent, and the fimbriated extremity of the tube obliterated. The adhesions of this side were broken up and the tube and ovary allowed to remain after opening up the fimbriated extremity of the tube and introducing a probe and finding the lumen patent. The right side was next attacked and freed from adhesions. The tube contained about four drachms of a clear, straw-colored fluid. The tube and ovary were removed and the uterus brought in its normal position of anteversion. Choloroform was used throughout the entire operation, and at the end of the operation, which I do not think consumed more than an hour from start to finish, the woman was in an excellent condition. She was put to bed and on the following day appeared remarkably well. Unfortunately no note was made of the amount of urine passed the first twenty-four hours succeeding the operation, but there was a microscopical examination made on that day—the 11th. The result was as follows:

General character.	Reaction.	Sp. gr.	Albumin.	Sugar.	Bile-pigment and salts.	Microscopic.
Straw color, cloudy, abundant sediment.	Acid.	1024	None.	None.	None.	Amorphous urates, granular débris.

Now it will be seen that the urine had been carefully examined prior to the operation and nothing abnormal found, and that also on the day following the operation a microscopical examination revealed nothing. On the 12th the woman began to vomit; she could not retain water or anything else on her stomach; her bowels had not been moved since the operation, which was forty-eight hours, though she had taken one-fifth of a grain of calomel every two hours to that end. It was suggested that the symptoms pointed to obstruction of the bowels. The uncontrollable vomiting along with our unsuccessful attempts to get the bowels open did make me weigh carefully the possibility of obstruction. Associated with this vomiting was a gradually increasing stupor, and coupled with this set of symptoms only four drachms of urine were found in the bladder for the entire twenty-four hours, which twenty-four hours ended on the morning of the 13th, the third day after the operation. I ordered at this time dry cups over the kidneys and the patient to be surrounded with hot-water bottles; strychnine and nitroglycerin hypodermatically were given as needed to sustain a weak and flagging heart. She could not be nourished by the mouth, and was sustained entirely by nutrient enemas of beef-tea and whiskey and peptonized milk. A few hours after the dry cupping she passed four drachms of urine, and her kidneys continued to secrete increasing amounts of urine, as follows: on the 14th she passed eight ounces; 15th, ten ounces; 16th, fifteen ounces; 17th, thirteen ounces; 18th, thirty-five ounces; 19th, thirty-eight ounces, etc. I should say just here that her temperature never went beyond 99° F.; her pulse was small and wiry, and she was bathed in a clammy sweat. For two days

I hourly expected her death. On the 13th her urine was again examined, and was as follows:

	General character.	Reaction.	Sp. gr.	Albumin.	Sugar.	Bile-pigment and salts.	Microscopic.
13th	Pale amber color, cloudy sediment.	Acid.	1028	Present.	None.	None.	Epithelium, hyaline casts.
14th	Reddish-brown color, cloudy, abundant sediment.	Acid.	1027	Present.	None.	None.	Epithelium, pus-corpuscles, red corpuscles, granular casts.
15th	Same as above (14th)						

On the evening of the 14th she had a large fecal evacuation after the administration of an enema thrown high up the bowel by means of a rectal tube; her bowels moved five times the following day, six times the next, and thereafter every day or two. As soon as we could begin to feed her by the mouth, which was on the evening of the 17th, she was given all the water she could drink, hoping to flush the kidneys in that way. No diuretic was given at any time, for the reason that the secreting cells of the kidney were swollen and inflamed, and, in our judgment, should not be goaded to secrete, even if it were possible to do so, which I doubt. Our main reliance laid in supporting our patient by nutrient enemas, to relieve congestion of the kidney by dry cupping and applying external heat, and to move the bowels freely. There was no need for pilocarpine, as the woman was already bathed in a profuse sweat. From the 17th the woman's recovery was rapid and satisfactory, and the semi-comatose condition she had been in for four or five days faded away as if by magic. Indeed, she seemed veritably to come to life again. The last examination made of her urine was on the 30th, just twenty days from the time she was operated on, and it was found normal. She left the hospital October 4th, apparently well. My object in using this case as a basis for a paper of admission to your Society is not that it is unique or that it has any unusual features. I report it because it has been

carefully worked up and that the nephritis occurred after chloroform anæsthesia; and also that there was no shock attending the operation or injury done the ureters or renal vessels or nerves, so far as known to me, to account for the nephritis. The operation was done in a reasonable time. As said before, the urine had been examined chemically and microscopically, and the quantity voided in twenty-four hours noted prior to the operation, and was found normal. On the day after operation the urine still was normal; the quantity passed unfortunately was not kept account of. Now, I think no one will doubt that this was a case of acute nephritis, and if occurring under other circumstances would have been designated a case of acute Bright's disease. On analyzing the case subsequent to operation an interesting feature is that the symptoms of nephritis did not appear until the afternoon of the 12th, about fifty hours after the operation. On the 11th and the morning of the 12th the patient expressed herself as feeling well, save that she was slightly nauseated, a not uncommon occurrence after laparotomy. There is but one conclusion as borne out by the facts in the case, and it is that the nephritis was due solely to the toxic influence of the chloroform upon the epithelium of the kidney, causing a true inflammation. It is well known to all surgeons that ether is more likely to set up a nephritis than chloroform; hence the careful surgeon, when the opportunity is afforded him, looks well into the condition of the kidneys prior to operation, and selects his anæsthetic according to whether he finds a perfectly functioning kidney or one more or less crippled. If there is any departure from the normal, chloroform is used in the belief that it is less likely to cause a nephritis, but that chloroform circulating in the blood can and does, under certain conditions of the kidney not yet definitely determined, produce a nephritis is now well recognized.

A CASE OF INTRACRANIAL NEURECTOMY OF FIFTH NERVE; SUPPURATION; RECOVERY.

By W. H. Doughty, Jr., M.D.,
Augusta, Ga.

Mr. President and Gentlemen: While there is nothing remarkable or especially noteworthy about the following case, the interest that attaches to all intracranial operations upon the fifth nerve leads me to put it upon record. The notes of the case have been unfortunately lost, but my recollection of the most important features is sufficiently clear to enable me to give them correctly.

Albert W., a mulatto, aged about fifty years, cook, had suffered since 1891 with a painful spasmodic affection of the right side of his face. His family history was good so far as it could be learned, and he had always been strong and robust and of good habits up to the time of the development of this infirmity. His pain occurred in well-marked paroxysms at approximately regular intervals, and was accompanied by clonic movements of the right masticatory muscles. The masseter and pterygoids seemed to be most affected.

The painful area was that of the distribution of the second and third divisions of the fifth nerve, and pressure upon or moderate handling of any part of this area invariably brought on a paroxysm at once. The spot of greatest sensitiveness was just over the mental foramen, and here the very slightest touch would precipitate an attack. He described the pain as being of terrific intensity, and his actions during a paroxysm indicated that his suffering was very great.

Early in the history of the disorder the attacks came at

relatively long intervals and very irregularly; but as time passed the intervals became shorter and shorter, while the paroxysms seemed to grow in intensity. For a year or more he had been having them many times each day and night, preventing his eating a sufficiency of food and constantly interfering with his sleep and rest. He thought that whiskey mitigated somewhat the severity of his suffering, and had for a long time been drinking it steadily and very freely. He was desperate from long suffering and fatigue, and was willing to submit to anything that offered even a hope of relief.

In appearance he was worn and haggard and exhausted, not thin, but with flesh that plainly indicated that he drank to excess. His pulse was rapid and feeble; but, upon general physical examination, no organic disease could be made out.

February 8, 1896, at the Lamar Hospital, in the presence of Prof. DeS. Ford and my usual assistants, Drs. H. C. Doughty and Le Grand Guerry, the patient was anæsthetized. The omega-shaped incision of Hartley was made down to the bone. The hemorrhage was very free, and a good deal of time and many ligatures were required to control it. With Hartley's chisels a trench was cut in the bone, entirely through both tables at the highest part of the curve of the omega, but along its limbs, through the outer table only. At the extremities of the limbs the trenches or grooves were cut in toward each other by directing the chisel under the soft parts, so that the bridge of bone remaining to be broken was somewhat narrower than, I believe, Hartley prescribes, while there was no interference with the blood-supply.

With a periosteal elevator inserted at the top of the omega, where both tables of the skull had been chiselled through, the flap of bone, periosteum, and overlying soft parts was raised.

This was done very slowly, with the hope of minimizing the dangers to the middle meningeal artery and its branches.

Only one of the posterior branches was torn, and the bleeding from this was controlled by finger-pressure until a fine catgut ligature could be passed around it and tied. With rongeur forceps the floor of the middle fossa was then cut away sufficiently to give room for manipulation after the raising of the brain.

As the condition of the patient under the anæsthetic had become very unsatisfactory, I thought it best to carry the operation no further then, but to close the wound and wait for a few days for him to recover from the effects of the loss of blood, which had been considerable for so weak a person. Accordingly the flap was laid in place and fastened there by several temporary sutures. Iodoform-gauze was packed into all deep spaces between the soft parts, and a copious dressing applied.

The history of the case presents nothing of interest from this time until February 12th, when he was again placed upon the table. Under anæsthesia the dressings were removed and the wound reopened. Immediately it was noticed that a small quantity of pus escaped from the cut surface of the temporal muscle.

As the bone flap seemed to be stuck firmly in place by the plastic exudate I thought there was good reason to hope that the infection was confined to the limited area from which the pus had been seen to escape; and as the patient's condition seemed to demand that the paroxysms be stopped at all hazards, I determined to finish the operation.

Accordingly, after thorough cleansing, all suspected tissues were cut away and every part of the wound, as it presented itself with the flap still in place, was repeatedly douched with Marchand's hydrogen peroxide. After some further washing the flap was lifted, and its under surface, together with the exposed surface of the dura and the deep recesses of the wound under the zygoma, was thoroughly treated with the peroxide and afterward with a weak bichloride solution. The dura was now gradually stripped up from the floor of the middle fossa with the aid of Allis's blunt dissector, and the

brain lifted with the special retractor which Hartley devised for the purpose. No bleeding of moment attended the separation of the dura, nor was it difficult to avoid injuring the middle meningeal and its branches. Upon reaching the round and oval foramina the dura was broken away from its attachments around each of them, and the second and third divisions of the nerve exposed.

This part of the operation was, I think, facilitated by the employment of two very simple implements which I had had made for the purpose. They were two long-handled button-hooks which had been so altered that in shape they were like long and rather stout and blunt tenacula. With the assistance of these I was able to strip up and incise the dura and expose the nerves quite fully, and the ganglion fairly well. Long silk threads were then passed around the nerves close to the foramina, and traction upon these facilitated somewhat the subsequent steps of the operation.

It had been my intention to try to split the ganglion and remove only that part of it to which the second and third divisions of the nerve were attached, since the first division has never given evidence of any involvement. I was prevented from doing this, however, by the fact that at the last moment, while trying to expose the ganglion more fully, I injured some vein, and the depths of the wound filled instantly with blood. I thought it came from the cavernous sinus, but could not be sure.

This venous hemorrhage was very annoying. It was easily stopped by a pledget of gauze, and the field would remain clear for a few moments after the gauze was taken away, but upon touching the third division of the nerve or the neighboring dura it would instantly recur and demand another packing.

After spending as much time as could be afforded in these repeated packings, I finally seized the ganglion with a pair of artery forceps, getting hold of the lower half or two-thirds of it, as nearly as I could judge, and attempted to pull it away together with the nerves that were attached to it.

Investigation after this manœuvre showed that a considerable part of the ganglion had come away in the grasp of the forceps; that the second division of the nerve had broken near the ganglion, and its comparatively long intracranial portion was hanging from the round foramen; that the third division had broken near the forceps, and the short, frayed ends of its stump were projecting from the oval foramen. I then caught the second division of the nerve with the forceps and attempted to pull out as great a length of it as possible. In this I succeeded very well, the foramen being left perfectly empty.

It was much more difficult to pick out the broken fibres of the stump of the third division. Some of it I succeeded in removing, but other parts of it I could not get hold of with the forceps at all. What I could not remove I disposed of by tucking down into the foramen as deeply and firmly as I could.

For the permanent control of the hemorrhage already spoken of, and as a safeguard in case of infection, the brain being still lifted upon the retractor, long strips of dry iodoform-gauze were very carefully packed between the dura and the floor of the fossa, and this packing was continued up to a point very near to the lower ends of the cuts through the soft parts. The ends of the gauze were then brought out through the ends of the wound. The wound was closed with silkworm-gut sutures, except at the ends, as above indicated, and at two points along the anterior and posterior curves of the omega, where were brought out the ends of other strips of gauze with which had been packed the space where the suppuration had been noted.

The patient was put to bed in good condition. On the third day the wound was dressed, and pus was again found upon removing the gauze from the upper part. A sufficient number of sutures were at once removed to give access with the syringe to every superficial part of the wound, and frequent injections of hydrogen peroxide were made. The gauze in the fossa was not disturbed. After a few days I began to

withdraw this also, very gradually, from day to day, keeping up the injections of peroxide as often as seemed necessary. In about ten days the gauze was entirely removed, drainage tubes were inserted to the bottom of the fossa, and through these the injections were continued. The strength of the peroxide was now reduced to one-half, and, later, to one-third; the injections were made only once in twenty-four hours, and each one was followed with an injection of balsam of Peru. Under this treatment the depths of the wound filled and closed up rapidly. The head was kept as much as possible in a position to promote drainage.

The general condition of the patient improved steadily and rapidly after the operation. He had, of course, no pain; and under the stimulation of plenty of sleep and well-regulated feeding and tonics his accession of strength was marked from day to day. The suppuration, which never became free, had no perceptible effect upon him, and the range of his temperature and pulse was altogether satisfactory.

A minute sinus in the anterior superior portion of the wound, with a barely perceptible discharge, persisted for several months, but finally closed after the escape of a small fragment of bone about the size of an average grain of sand.

At this time, after the lapse of eight months, his general health seems perfect, and he has gained much flesh. For several months after the operation there was a decided stiffness of the jaw, which prevented his opening his mouth fully, but did not interfere with his chewing. As time passed this became less and less; and now he thinks he opens his mouth as wide and as well as he ever did.

He has diminished acuteness of hearing in his right ear, which he says did not exist before the operation, but has been noticed by him ever since. It is not getting worse. As no examination of his hearing was made prior to the operation, it is impossible to know whether he is correct or not. It is to be presumed, however, that he is.

Comparing the sensitiveness of the two sides of the face, the right seems nowhere quite as sensitive as is the left.

There is very markedly diminished sensation over the areas of skin that are supplied by the second and third divisions of the fifth nerve (see Vierordt's *Medical Diagnosis*, p.485) except at one spot just below the malar bone, where sensation is diminished, but to a distinctly less degree.

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